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THE SURGICAL TREATMENT OF POLYPOSIS OF THE COLON

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SINCE the first report of an authentic case of diffuse polyposis or adenomatosis of the colon by Menzel[1] in 1721 and subsequent observations by Rokitansky[2] in 1839, medical literature is replete with an increasing number of reports which deal with etiology, familial tendency, and transition from benign to malignant processes. It is likely that Menzel's case was of a secondary type since the patient died of chronic dysentery. Lebert's[1] report in 1861 was probably the first case of true polyposis. Dukes,[2] who summarized all available literature in his paper published in 1930, believes that the condition was not accepted as a disease until Boas in 1901 differentiated polyposis from isolated papillomata and adenomata. The most important characteristic of this disease, namely, familial tendency, was first noted by Cripps[3] in 1882 in a report of 2 cases of polyposis in the rectum in the same family.

Classification: The early literature was completely confused by the plethora of titles given the disease and by the loose pathologic classification which admitted a large group of cases which did not possess true adenomatous polyps and did not show hereditary characteristics. In 1925 Erdmann and Morris[4] suggested a classification of the disease into 2 groups: (1) Adult or acquired type (which are post-inflammatory pseudo-polyps) and (2) Adolescent or congenital polyps, these being the true adenomatous growths. Wesson and Bargen[5] in 1934 advocated a similar grouping, placing

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more emphasis on the etiologic and pathologic differences. As early as 1896 a histologic grouping was suggested by Hauser[6] but only the epithelial elements were considered. Wechselmann[7] in 1909 presented a 3 phase grouping but again used only differences in epithelium as criteria for the division. Schemeden and Westhaus[8] in 1927 introduced a consideration of the connective tissue framework and, using this work, with Fitzgibbon one of us[9] (F.W.R.) published in 1931 a convincing argument for the transition of most benign adenomata of the colon to malignant tumors. These writers divided true adenomatous polyps into 3 groups:

Group 1. Those polyps in which the epithelium retained its normal characteristics. These tumors are nodular and are supported on stalks of loose connective tissue from the submucosa. There is no branching and no papillary forms are in this group. The tumors vary in size from 3 mm. to 1 or 2 cm. in diameter. There is no indication that the polyps in this group are more prone to malignancy than normal intestinal mucosa.

Group 2. The tumors of this group show widespread failure of epithelium to differentiate into units of normal mucosa. The cells are hypertrophied and elongated and may be piled into multilayered buds which project into the lumen of the tubules. The production of mucus is greatly diminished and proliferation is very irregular. If the tumor does not grow too fast, the connective tissue of the stalk is pulled into ever-branching divisions, which, with the hyperplastic epithelium, form a shaggy, papillary structure. These tumors attain the greatest size of any polyps and are very frequently overtaken by malignant changes.

Group 3. The tumors in this group are not sharply demarcated from the growths in group 2 but are composed of accentuated forms of group 2. The size of these tumors is limited to 6 to 8 mm. in diameter and the cellular structure is so rudimentary as to be hardly recognizable as mucosa. Frequently the cell morphology is indistinguishable from carcinoma and the growth of the epithelium rapidly becomes invasive in character. The rate of epithelial proliferation is so great that there is practically no connective tissue stroma in the tumor, giving these growths their characteristic microscopic appearance.

In support of this classification we presented 13 cases of polyposis of the colon which had produced 24 carcinomas. The malignancies were distributed among 11 patients, and 21 of the 24 growths were found in 8 of the patients. Only 2 of the 24 cancers could not be proved to arise from polyps. All of these malignancies arose from polyps of Group 2 or 3.

Incidence: Estimates of the incidence of congenital polyposis in the general population range from 0.13 per cent in children to 21.4 per cent in all age groups. Polyps comprise approximately 60 per cent of all benign intestinal tumors.

Symptoms: Early symptoms of the disease are so mild as to be frequently ignored by the patient until many months or years have passed. This is perfectly indicated by the 10 patients in this group, of whom 2 had no symptoms and were diagnosed only because examination was performed as a result of some other member of their family being found to have polyposis. Only 3 out of 10 appeared for diagnosis within the first 6 months, and 4 patients endured their symptoms for more than 5 years. Buie[10] reported in 1937 that of 1,520 patients with polyposis, 53 per cent had been symptomatic for more than 3 years, and 24 per cent more than 10 years.

The outstanding symptoms of the disease, both in this group and in all reported series, is blood in the stool. In this group of 10 patients, 8 had this complaint as the reason for seeking medical aid. Although many varied complaints are listed as being typical of polyposis, we found only four others in this group. Cramping was noted by 5 patients, diarrhea by 4 and tenesmus by one. Two were asymptomatic, as noted before.

Heredofamilial Tendency: The hereditary factor in diffuse polyposis has been consistently noted since Cripps first reported his cases. Lockhart-Mummery[11] has advanced the theory that this tendency represents a gene mutation inherited as a Mendelian dominant which may be transmitted by either sex. Various widely divergent estimates of the incidence of polyps in a family carrying this trait have been made but it is obvious from the discrepancies in these reports that it is impossible to assign a percentage incidence to it.

In the present series of cases, there are 10 patients, the family history of 2 of whom cannot be obtained. In the other 8 patients there are 5 who have a family history of polyps and 6 of the 8 have a definite family history of colon carcinomas. Thus we see a group demonstrating a 50 per cent family incidence of polyposis and 60 per cent incidence of carcinoma with 20 per cent of the families unknown. These figures represent a total number of cases of polyposis of 19 and a total of 10 carcinomas. A very striking example of the strong heredofamilial trait will be shown in the discussion of cases 9 and 10.

Diagnosis: The only way to diagnose diffuse polyposis of the bowel is by careful proctosigmoidoscopic and roentgenologic examination. Any patient presenting symptoms suggestive of a large bowel lesion is a potential case of polyposis and since there are no

pathognomonic symptoms of the disease, it must be eliminated by complete studies of the large bowel. The gross appearance of polypi through the sigmoidoscope is perfectly typical and offers no problem to the trained observer. The tumors are either sessile in appearance or pedunculated. They may be seen singly or in groups.

If polypi are found in the rectum, it is necessary to confirm the extent of the lesion by contrast x-rays. A routine barium enema is not suitable for this purpose. The double contrast technic, using air insufflation of the colon, must be used if successful demonstration of the tumors is to be obtained. The patient should be well prepared by the administration of one ounce of castor oil on the previous day, followed by cleansing enemas till clear the morning of examination.

Treatment: The treatment of polyposis of the colon is solely surgical. Many medical measures have been advocated without effect. Roentgenotherapy has been used by some with temporary benefit of symptoms and reduction in size of the polypi (McKinney).[12] However, these results are temporary at best and are frequently attended by systemic reactions of some consequence.

The first surgical treatment used was simple ileostomy but this was obviously inadequate and to patients with mild symptoms of polyposis, the treatment was far worse than the disease. The logical approach was, of course, the extirpation of the pathologic tissue, and all procedures since have been aimed at this result. Due to the obvious dangers attending resection of the functioning colon, colectomy was preceded by ileostomy in the beginning, and some of these patients were subjected to total colectomy and left with a permanent ileostomy.

Due to the easy access to the rectum and lower sigmoid for lower removal of polyps, it was later advocated that the colon resection should be subtotal and the continuity of the bowel should be reestablished in the lower sigmoid, thus preserving sphincter action and eliminating the distressing ileostomy. This procedure was either followed or preceded by fulguration of polyps in the rectum by proctoscopy. This is the procedure which is accepted today as the most satisfactory and has been used in 4 cases in this series with minor modifications in 2, required by individual considerations in each case.

The work reported by Ravitch[13] in 1947 on total colectomy with preservation of the anal sphincter and the establishment of an anal ileostomy is enormously interesting. We feel that it is fundamentally sound and offers a more satisfactory result than the present

procedure. It is to be hoped that its further employment in a goodly series of cases bears out its promise.

The following 10 cases are presented as being typical of diffuse polyposis of the colon:

CASE 1. White female, aged 21, was admitted in March, 1933, with a history of bloody diarrhea 4 to 8 times daily as long as she could remember. She had, on admission, moderate cramping and tenesmus which had existed for several years. A single-barreled ileostomy had been performed at the Mayo Clinic in October, 1932. Her family history was negative for disease of the colon or rectum.

On admission to the hospital she showed moderate weight loss and anemia, but was otherwise in good condition. After preparation she was submitted to the following operations:

March 15, 1933, subtotal colectomy

June 3, 1933, dilatation of ileostomy

Sept. 26, 1933, combined abdominoperineal resection of the rectum.

The pathologic diagnosis was diffuse adenomatosis of the colon and rectum. The patient developed continual cramping pains with occasional vomiting and was rehospitalized on March 14, 1934, at which time a plastic was performed on her ileostomy. This did not relieve her symptoms, and on March 18, an exploratory laparotomy was performed for intestinal obstruction. At operation an omental band was found obstructing the jejunum and this was released. The postoperative course was uneventful and the patient was asymptomatic thereafter. She was last heard from in 1938, at which time she was in good health.

CASE 2. M. C., white female, aged 26, was admitted in July, 1934, with a history of diarrhea, abdominal cramps and blood in her stools for 8 to 10 years, getting worse for the past year. She had had no weight loss. In her family one son, 2 sisters, and her mother had been diagnosed as having polyposis. One other sister has been diagnosed since (1940) as having the disease.

On admission there was nothing notable in her physical examination or laboratory work. X-rays showed diffuse polyposis of the colon. On July 5, an ileostomy was performed with an uneventful postoperative course. On Nov. 16, 1934, a subtotal colectomy was performed.

Pathologic diagnosis was diffuse adenomatosis of the colon.

The patient was making a good recovery from the last operation when, on December 4, 18 days after operation, she developed a pulmonary embolism and died immediately.

CASE 3. Mrs. P. C., white female, aged 33, was admitted in June 1935, with a history of "colitis" for 11 years with 10 to 15 stools daily containing blood and mucus, and abdominal cramps. One week prior to admission she had had an x-ray and proctoscopic examination, both of which were positive for polyposis. She had not suffered any loss of weight. Her family history revealed that her father had died of carcinoma of the colon at the age of 45. One sister had been operated on for carcinoma of the colon and one brother was found to have an inoperable carcinoma of the colon at the age of 37.

On admission, physical examination was negative for any other pathology. The laboratory work showed only a mild secondary anemia.

On June 5, a single-barreled ileostomy was performed. She was rehospitalized on Sept. 12, 1935, and, since she could not tolerate her ileostomy, an ileosigmoidostomy was performed as a second stage of the procedure. After ileosigmoidostomy, her rectal polyps were fulgurated at repeated sittings.

On June 13, 1936, a subtotal colectomy was performed, the resection being done just above the site of anastomosis. The patient was last heard from in good health in December, 1941.

CASE 4. L. H., white male, aged 21, was admitted in July, 1935, with a history of bloody stools for several months. He had no cramping or diarrhea. He was diagnosed before admission by proctoscopy as having polyps in his rectum, and an x-ray before admission showed diffuse polyposis. The patient knew nothing of the family history as far as colon disease was concerned.

Physical examination and laboratory work were essentially negative on admission. On July 23, 1935, a single barreled ileostomy was performed, and the patient was allowed to leave the hospital. On readmission to the hospital in March, 1936, a subtotal colectomy was performed and fulguration of the rectal polyps was accomplished after an uneventful recovery from the operative procedure.

In July, 1936, a side-to-side ileosigmoidostomy was performed over a Murphy button. The patient developed a moderately severe wound infection which cleared up rather rapidly under treatment. He was dismissed from the hospital and was not heard from until December, 1941, when he was reported as being in good health except for the presence of a ventral hernia at the site of his laparotomies.

CASE 5. A.M., a 15 year old white male, brother of G. M. (Case 8), was admitted in February, 1937, with a history of rectal bleeding for 4 months before admission. Otherwise, he was totally asymptomatic. Between the time of his diagnosis and admission to the hospital, he had repeated fulgurations of rectal polyps. His family history revealed that his father had died of carcinoma of the rectum at the age of 33. No other colonic disease was known of in his family.

On admission his physical examination and laboratory work were negative. On March 13, 1937, an ileosigmoidostomy was performed over a Murphy button. On June 22, a subtotal colectomy was performed down to the site of anastomosis. The pathologic diagnosis was diffuse adenomatosis of the colon. His postoperative course was completely uneventful and he was dismissed from the hospital 4 weeks after his colectomy.

In 1941, he had 3 small polyps fulgurated in his rectum. Routine checks every 4 to 6 months have revealed no more polyps. The patient is totally asymptomatic at the present time.

CASE 6. G. D., a white male, aged 48, was admitted in June, 1937, with a history of having had rectal polyps discovered at a routine examination in 1930. These were fulgurated at that time. He had had frequent subsequent removals of polyps up until the time of admission. He had no bleeding, diarrhea, or cramps. There was no family history of polyps or other colonic disease.

On admission, his physical examination and laboratory work were essentially

normal. On June 17, 1937, an ileosigmoidostomy was performed. The patient had a stormy postoperative course, developing a low grade peritonitis and subsequently intestinal obstruction from which he died July 23, 1947.

Case 7. Multiple polyposis of the entire colon showing several large pedunculated polyps but no malignant degeneration was shown in any of them.

CASE 7. L. C., white female, aged 25, was admitted in May, 1939, with a complaint of abdominal griping and bloody stools beginning 6 years before admission. Proctoscopy at that time showed multiple polyps but the patient refused any surgical treatment. She continued to pass blood and have cramps and diarrhea from 10 to 15 times daily for 4 years. A cecostomy had been performed in 1935. It was closed in 1937 and reopened about a month later. An ileocolostomy was performed in 1938. This operation was complicated by a severe wound infection and fecal fistula. She had continual left lower quadrant pain and had lost 8 pounds. She continued to have 5 or 6 stools daily with blood in each.

The only point in her family history of any significance was that a paternal grandfather had died from a massive bowel hemorrhage.

On admission her physical examination revealed a poorly nourished female with a fecal fistula in the right lower quadrant. On June 7, 1939, the fecal fistula was closed and a subtotal colectomy down to the site of previous anastomosis was performed.

Pathologic diagnosis was multiple adenomatosis of the colon. She developed a moderately severe wound infection at the site of her fecal fistula but this cleared up on conservative treatment. Her postoperative course was uneventful thereafter and she left the hospital asymptomatic.

Follow-up on the patient showed that in July, 1942, she had had an exploratory laparotomy for an intra-abdominal mass which obstructed the small

bowel. No definite diagnosis could be obtained from the surgeon but he thought that the mass was a group of retroperitoneal metastic glands. She received x-ray therapy with some regression of the growth. She was last heard from in October, 1943, at which time she was in fairly good health.

CASE 8. G. M., aged 26, was admitted in March, 1940, with no complaints. He had been diagnosed as having diffuse polyposis of the colon and rectum on a check-up which was performed because of his brother's previous experience with the disease. He had all of the polyps in his rectum fulgurated up to a distance of 30 centimeters before his admission.

On his admission, physical examination and laboratory work were both essentially normal. On March 8, 1940, he was explored with the idea of doing an ileosigmoidostomy but a large mass of polyps was found at the proposed site of anastomosis, so a double-barreled colostomy was performed to allow further fulguration from above and below.

After removal of the polyps in the sigmoid, he was readmitted, and on May 24, 1940, an aseptic ileosigmoidostomy was performed over the Rankin clamp just below the level of the colostomy. On June 30, 1940, the lower loop of the colostomy was closed. On Oct. 4, 1940, a colectomy down to the site of the previous colostomy was performed along with the repair of an incisional hernia. His postoperative course was uneventful, but 2 years later he had a recurrence of the incisional hernia and this was repaired again. The last follow-up in 1947 showed the patient to be asymptomatic with no recurrence of polyps in the rectum.

CASE 9. G. U., white male, aged 32, was first admitted in January, 1947, with a history of having been diagnosed as polyposis of the colon one year before, after 3 or 4 months of rectal bleeding.

On Jan. 16, 1947, 5 days before admission, he had several polyps fulgurated and thereafter developed severe abdominal pain, nausea, and diarrhea. He had a high fever, with chills the night before admission. Physical examination showed the man to have pelvic peritonitis and he was treated with massive doses of penicillin and sodium sulfadiazine combined with constant intestinal decompression with the Miller-Abbott tube. An uneventful recovery was made and the patient left the hospital on the fourteenth day. He continued to have polyps fulgurated without further complications.

On June 16 he was readmitted to the hospital and at that time his chief complaint was a painful mass in the right upper quadrant. On May 20, 1947, an exploratory laparotomy was done and a massive carcinoma of the transverse colon near the hepatic flexure was found. A side-to-side ileosigmoidostomy was performed and the patient made an uneventful recovery, leaving the hospital on the eleventh postoperative day.

He was readmitted Aug. 11, 1947, and the mass in his right upper quadrant at that time was definitely larger. On August 16, a subtotal colectomy down to the site of anastomosis was performed.

Pathologic diagnosis was extensive polyps of the entire colon, and massive adenocarcinoma in the transverse colon near the hepatic flexure, Grade III. Smaller adenocarcinoma 13 cm. below the first growth, Grade II.

The patient left the hospital on the thirteenth postoperative day, and follow-up in January, 1948, showed him to be totally asymptomatic.

Case 9. Diffuse polyposis of the colon shown in every segment with 2 carcinomas present, one near the hepatic flexure and one near the splenic flexure.

The family history of this man has not been mentioned but will be covered in the discussion of his family tree later.

CASE 10. M. W., aged 34, sister of G. U. (Case 9). This patient was first admitted on June 23, 1947, with no complaints. She had had a proctoscopic examination and x-ray of her colon after her brother was diagnosed as having polyps and was found to have diffuse polyposis herself.

One June 30, an ileosigmoidostomy was performed. Her postoperative course was satisfactory and she was dismissed from the hospital on the tenth postoperative day.

She was readmitted in August, 1947, and on August 15 a subtotal colectomy was performed down to the site of anastomosis.

Pathologic diagnosis was diffuse polyposis involving the entire large intestine, and adenocarcinoma of the right colon, Grade II.

There had been no suspicion of the presence of a malignancy in this patient preoperatively. Her postoperative progress was entirely satisfactory and she left the hospital on the thirteenth postoperative day.

The family history for Cases 9 and 10 is being considered separately because we feel that it is an interesting and unusual one, and

Case 10. Diffuse polyposis of the colon. This patient is the sister of Case 9 shown on preceding page.

because we feel that it serves as an excellent illustration of the familial tendency in diffuse polyposis and the characteristic degeneration of the carcinoma of polyps in the colon.

The first slide is an outline of the family of Cases 9 and 10, covering four generations. The cases of polyposis shown on this chart are proved either by x-ray and proctoscopy or by autopsy examination. In the cases of carcinoma of the colon shown in the first generation, the liberty has been taken to make this diagnosis on the statement of the patients since no further investigation is possible.

The male shown in the third generation on the left side of the slide is of particular interest since he was killed at the age of 21 while in action in the second World War, and one week prior to his death had written members of his family stating that he had started passing blood by rectum. Cases 9 and 10 can be seen on this chart in the third generation. The lowest three members of the family on this chart are children of Case 10—a male and female having been examined and found to have polyps, and a male yet to be examined.

A summary of the family history for four generations shows 7 cases of proved polyposis, or 29.17 per cent; 6 carcinomas of the colon or rectum, with a percentage of 25 per cent. Only 4 members of the family are living and their present condition with regard to colonic disease is unknown. Two members of the family have died from some other cause, although in one, as has been noted, there is a strong suspicion that polyposis was present at the time of death. Five members are known to have no colon disease, either polyps or carcinoma, at this time.

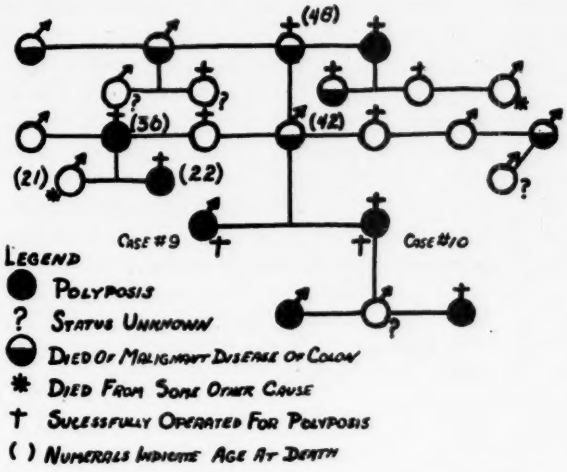

Chart of the Underwood family, showing instances of polyposis and malignancy.

Thus, we have a family in which 54.17 per cent are known to have had either carcinoma of the colon or diffuse polyposis. Untraceable are 24.99 per cent and 20.83 per cent have no colonic disease at this time.

This series of 10 cases illustrates very well the trend in surgical treatment of polyposis of the colon. It will be noted that the change to operations which involved the ileosigmoidostomy as a primary operation without ileostomy, followed by subtotal colectomy and fulguration or preceded by fulguration, began more than 10 years ago and has been accepted lately as a routine form of treatment.

SUMMARY

The disease entity of familial or hereditary diffuse polyposis of the colon has been discussed. The history and classification have been covered briefly and a rather extensive discussion of the prog-

nothesis and transition of benign to malignant tumors has been considered. Ten cases of diffuse polyposis of the colon operated upon by the senior author have been presented with consideration of changes in the surgical philosophy of the management of the disease being discussed.

Conclusion

Diffuse polyposis or adenomatosis of the colon is a fairly common lesion which has a definite hereditary tendency. The benignancy of the lesion is easily and in some cases rapidly transposed into a malignant tumor. A practical classification of polyposis of the colon based on the histologic structure not only of the epithelial elements but of the connective tissue stroma has been reoffered for consideration and the tendency toward transition to malignancy in each group has been discussed. Ten cases of polyposis of the colon with their operative treatment have been presented and the family history of polyposis and also carcinoma have been considered. The trend of surgical treatment of polyposis of the colon is turning toward a more anatomic and physiologic solution of this problem.

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ACUTE CHOLECYSTITIS

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With prolonged life expectancy, an increase in all phases of biliary tract disease is to be anticipated. Although there is reasonable uniformity of opinion in the management of chronic gallbladder conditions, there is sharp divergence of thought among physicians in the therapy of acute cholecystitis. Review of the recent literature reveals that early operation has proved to be the preferable procedure in most hands. This enthusiasm for early definitive therapy is unfortunately not shared by many of our medical colleagues—especially internists and general practitioners. One cannot help but be distressed at the casual management of early acute cholecystitis so frequently encountered in every day surgical practice. Too often surgical opinion is sought only when the patient is in the stage of advanced disease. Obviously, the time of ideal management has been overlooked, and one has to cope with the complications of acute gallbladder disease at this stage. Education of our fellow physicians to regard acute cholecystitis as a surgical emergency would materially lower the present morbidity and mortality of the disease. Reluctance to advise early surgery reflects an unawareness of the striking reduction in surgical mortality in the management of all phases of biliary tract disease in the past few years.

Etiology. Since all inflammatory reactions were once regarded as due to infection, it was only natural that bacterial invasion was widely accepted as the etiologic factor in acute cholecystitis. The experimental production of gallbladder inflammation by injecting streptococci into the portal circulation seemed to substantiate the infectious hypothesis. Recent investigations have emphasized the importance of chemical or metabolic factors in the pathogenesis of acute cholecystitis.

Edmund Andrews was among the earliest observers to question the infectious etiology of this disease. Careful culturing of the bile and gallbladder walls in normal, chronically diseased and acutely inflamed gallbladders revealed no significant quantitative or qualitative difference. This failure of correlation between bacterial invasion and pathologic findings cast serious doubt as to the bacterial etiology of acute cholecystitis. Andrews et al produced an experimental picture clinically indistinguishable from acute cholecystitis by injecting bile salts into the gallbladder.

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Womack[22] logically explains the pathogenesis on the following factors: (1) cystic duct obstruction, (2) damaging action of the entrapped bile on the gallbladder wall, and (3) bacterial invasion, which is inconstant and always secondary. Experiments on dogs substantiated this view, for cystic duct obstruction without removal of the bile in the gallbladder resulted in acute inflammation, varying in severity in direct relation to the concentration of cholesterol and bile salts. Yet, identical obstruction of the cystic duct with replacement of the gallbladder bile with normal saline resulted in no inflammation.

Course. Clinically, cystic duct obstruction is the initiating factor in the pathogenesis of acute cholecystitis. Rarely the obstruction is due to inflammatory edema, malignancy or congenital anomaly. In over 97 per cent of cases, an impacted calculus is the obstructing factor. As long as the obstruction persists, the course is a progressive one for there is steady increase in intravesical pressure with resultant vascular interference. Gangrene, perforation, and peritonitis are inevitable if the cycle is not interrupted. Fortunately, nature relieves the increased intravesical tension in 80 to 90 per cent by dislodging the stone into the gallbladder or by passage of the calculus into the common duct. However, surgical interference is absolutely essential in 10 to 20 per cent to interrupt the vicious cycle and prevent serious dissemination of the disease.

The crux of the debate in the therapy of acute cholecystitis is the ability to determine by clinical and laboratory methods which course of events is ensuing; that is, whether the disease is progressing or regressing. Most surgeons agree that there is such a lack of parallelism between the clinical picture and the underlying stage of pathology, that so-called "watchful waiting" is fraught with danger. Touroff[20] forcefully emphasizes this point in a report of 75 cases of pathologically proved acute cholecystitis, in which 52 had absolutely no clinical evidence of acute disease, and 23 had only minimal signs and symptoms. Yet many of these cases had advanced to the stage of empyema, gangrene, and even perforation, despite the paucity of clinical findings.

It is only logical to regard acute cholecystitis as a progressive disease and to take the necessary steps to overcome the initiating obstructing factor. Watchful waiting unduly endangers the group of 10 to 20 per cent in which the obstruction will not be relieved spontaneously.

Treatment. When one reviews the recent literature, he finds an increasing skepticism of conservative therapy in acute obstructive cholecystitis. While the rationale of delayed operation was not so

greatly questioned 20 years ago, the pendulum has swung decidedly towards early operation in the past decade. Surgery *must* be carefully considered in every case. The all too frequent finding of gangrene, empyema, and perforation, without significant variations in the clinicolaboratory picture, makes it obvious that "clinical impression" is too inexact, even in the best hands. Fallis and McClure,[6] in a series of 320 cases of acute cholecystitis, report an incidence of 15.9 per cent gangrene and perforation. Cowley and Harkins,[3] in a collected series of 2,261 cases of acute gallbladder disease, found an average incidence of perforated gallbladder in 13 per cent. Proponents of the conservative school occasionally contend the incidence of ruptured gallbladder to be less than 3 per cent. However, such low figures are derived from mixed series of both chronic and acute biliary tract disease and by no means indicate the frequency of peritoneal soiling in acute gallbladder disease. Unfortunately, this obvious fallacy is used to support the contention that acute cholecystitis is a relatively benign and self-limited disease. Heuer,[11] in an exhaustive study of personal cases and the literature, concludes that a policy of inactivity towards the disease results in a 20 per cent incidence of complications, including abscess and peritonitis. Any form of management which will inadvertently allow the disease to progress to such an advanced state is to be strongly condemned. Obviously, material lowering of the still appreciable mortality rate would result from a plan of therapy which avoided the stage of perforation and peritonitis. This can only be accomplished by early operation.

Stone and Owings,[19] in a classic discussion before the American Surgical Association in 1933, emphasized that early operation would result in a notable saving of lives, time, and expense. They concluded that it was just as logical to operate on acute cholecystitis as acute appendicitis or ruptured ulcer, although gallbladder perforation as a rule would localize better. For years, Glenn[9] has been one of the foremost advocates of early operation. Utilizing a policy of operating upon all patients after adequate preparation has resulted in the enviable mortality rate of only 2.4 per cent in a series of 527 patients at the New York Hospital. Lester adheres to this plan and reports a mortality of less than 2 per cent in a series of 109 cases.

Wallace and Allen,[21] in a painstaking study of 415 cases of acute cholecystitis at the Massachusetts General Hospital, found gangrene present in 29.4 per cent of all cases; over half of these cases were complicated by perforation, which increased the mortality from 5.3 per cent to 17.2 per cent. These authors were unable to find any reliable criteria to indicate perforation and gangrene.

Despite the most careful clinical observation, 30 of their cases suffered perforation while being observed in the hospital!

Ochsner, Brunazzi and the author[17] carefully studied all cases of acute cholecystitis admitted to the Charity Hospital of New Orleans during a 5 year period ending January, 1946. The series was unique in that all factors were identical except for the difference in the surgical management. The patients, hospital facilities, and technical ability of the surgeons caring for the cases were absolutely uniform. Thus, an excellent opportunity for controlled comparison of results in acute cholecystitis was offered, for one school service favored early operation and the other, delayed intervention. Only the severest cases were considered: those with unquestionable clinical acuteness and definite gross and microscopic evidence of inflammation. Quite a few cases were clinically acute and presented gross evidence of edema and hemorrhage at early operation, yet were classified as subacute or chronic by the pathologist. These cases were excluded from the study, although such exclusion inadvertently favored the conservative therapy figures. In the latter group, all cases who were clinically acute and subsequently had gallbladder disease of any type proved at operation were included. Obviously, such rigid criteria subjected the plan of early operation to critical analysis. All necropsy cases were included.

Of the 140 cases who met the aforementioned rigid criteria, 54 per cent were treated by early operation, 46 per cent by the delayed method—i.e., careful observation by all clinical and laboratory facilities until the disease subsided or progressed to a stage making operation imperative. In analyzing the clinical picture, it was found that 25 per cent failed to present leukocytosis and only 30 per cent had admission temperatures exceeding 100.8 degrees. Palpable mass was found in 40 per cent. Certainly, it is a mistake to wait for leukocytosis, definite febrile response, or palpable mass before making a clinical diagnosis of acute cholecystitis.

As would be expected, more advanced pathology was found at operation in the delayed group for valuable time had been lost waiting for the disease to subside. In the conservative group there was a 22.5 per cent incidence of empyema as contrasted to 10.5 per cent in the early operation series; perforation with localized peritonitis in 6.5 per cent as compared to 3.9 per cent in the early group. Surprisingly, there were 5 cases of unquestionable diffuse or generalized peritonitis in this series of 140 cases; an incidence of 3.6 per cent! Although admittedly this is a series of advanced acute gallbladder disease, it is evident that such free, unwalled-off perforation is by no means the rarity it is considered to be by many. Associated adenocarcinoma of the gallbladder was found in 2 cases, or 1.4 per

cent. This further emphasizes the danger of treating calculous cholecystitis medically.[7]

In those cases hospitalized within 3 days of the onset of their acute illness, mortality was 6.7 per cent in patients submitted to early operation and 12.5 per cent in those treated expectantly. However, in those patients hospitalized more than 72 hours after the beginning of this acute episode, 18 per cent died if submitted to early surgery, while 9 per cent expired when conservative therapy was practiced. Although the series is small, it is evident that early operation, after a 4 to 6 hour period of preoperative preparation, featuring rest, gastric decompression, and restoration of fluid, electrolyte and protein balance is the treatment of choice for those cases seen within the first 72 hours of the disease.

Unfortunately, this relatively short "golden opportunity" is frequently lost in procrastination and temporizing, wishfully hoping the disease will subside. Acute cholecystitis of longer standing—i.e., more than 72 hours after the onset of the disease—should be treated conservatively if at all possible. This plan of therapy is similar to that practiced by Wallace and Allen[21] and others.

Morbidity studies showed the average hospitalization in the early operation group to be 19.5 days, in the delayed operation group 30.5 days. Analysis of the temperature records disclosed little difference in days of pyrexia (over 100.8 degrees), averaging 4.1 in the early and 5.1 in the delayed group. The incidence of wound infection was 10.9 per cent in the conservative group and 6.3 per cent in the early operation series.

Cholecystectomy is without a doubt the procedure of choice in trained hands; it will be feasible in above 90 per cent of acute cases. Cholecystostomy is occasionally a life-saving procedure and should be done without apology in those patients in whom the general condition is questionable or the local pathology so marked as to make identification of the vital structures (*a prime prerequisite of any cholecystectomy*) not feasible. In a few cases of gangrene and perforation, the method of partial cholecystectomy first suggested by Denegre Martin should be used. Choledochostomy is indicated, if the condition of the patient permits, when jaundice is present, palpable stones are evident, the common duct is thickened and unquestionably dilated, and in the presence of moderate to marked associated pancreatitis. In the series of Ochsner, Brunazzi and Johnston, choledochostomy was done in 36 of 109 acute cases, an incidence of 33 per cent; 39 per cent of the explored cases proved to have common duct stones. Exploration of the common duct did not add to the operative mortality.

Conclusions

1. The incidence of acute cholecystitis could be materially reduced by the preventive surgical policy of removing all gallbladders containing calculi.

2. Regarding acute cholecystitis as a surgical emergency would result in significant lowering of the still appreciable mortality, for the stage of complications: gangrene, empyema, and perforation, would be largely avoided.

3. The lowest mortality in acute cholecystitis is obtained when surgery is done within 72 hours of onset of the acute episode.

4. The period from 4 to 7 days after the onset of the acute disease is the stage of complication and should be managed conservatively if at all possible. If progression of the disease is evident and surgery is mandatory, cholecystostomy will often be the procedure of choice.

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HUMAN BITES

A Study of a Second Series of 93 (Chiefly Delayed and Late) Cases from Charity Hospital of Louisiana at New Orleans

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IN the course of an excellent general discussion of infections and injuries of the extremities, Siler[1] made a statement which might well serve as the topic sentence of every discussion of human bites, namely, that hospital staffs, residents and internes do not have enough respect for this type of injury. My own observations have brought me to the conclusion that if the method of treatment applied to a human bite is predicated upon a proper appreciation of its dangerous potentialities, and if this appreciation is predicated, in turn, upon a proper understanding of the pathologic process, the outcome is likely to be good. If, however, the injury is treated without proper respect for the possibilities inherent in it, and without a proper understanding of the lesion, the outcome is likely to be poor and may be disastrous.

These are sweeping generalizations, but they are borne out by every recorded series. Hudson,[2] for instance, who defined a human bite as a "trivial wound followed by a virulent destructive lesion," reported the end-results in 13 bites of the hand. Only 7 of the 13 patients were left with complete function. Four suffered amputation of a metacarpal joint and finger, one lost the extremity below the elbow, and one had some limitation of movement. Considerably less than a thousand instances of human bites are now on record in the literature, but 8 fatalities occurred among them. An injury in which such results can occur is undoubtedly deserving of the greatest respect and undoubtedly has not received it.

INCIDENCE

Since the first human bite was reported by Hennessy and Fletcher[3] in 1920, this type of injury has ceased to be a medical curiosity. Its establishment as a clinical and pathologic entity occurred with the publication in 1930 by Mason and Koch[4] of an exhaustive clinical analysis of 13 personally observed cases, together with an extensive anatomic and experimental study of the routes by which infection spreads following a human bite of the hand.

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In a report on this subject in 1941,[5] which included a fairly complete review of the recent literature, I pointed out that to date the recorded cases seemed to number 671, to which I was adding 90 (chiefly neglected and late) cases from Charity Hospital of Louisiana at New Orleans. Since that time several individual cases have been recorded to illustrate special phases of pathology or treatment,[6-12] and four series have been recorded, including 14 cases reported by Hudson,[2] to which reference has already been made, 28 reported by Lowry,[13] 31 reported by Siler,[1] and 61 reported by Miller and Winfield.[14] These additional reports, which are exclusive of one or two contributions in the foreign literature not available to me, bring to just over 800 the number of recorded cases of human bites.

To this number I am now adding 126 chiefly late and neglected bites which occurred in 93 patients hospitalized for these injuries at the Charity Hospital of Louisiana at New Orleans, from which my first report of 90 cases was made in 1941. The present report covers the period between Jan. 1, 1941, and Oct. 1, 1947. The first report covered the period 1923 to 1940 inclusive, but a comparison of the incidence would not be fair since it was impossible to locate a number of cases which were known to have occurred during the earlier period.

The exact incidence of human bites in comparison with other injuries and infections of the hand has not been estimated and I can contribute nothing in this respect. Siler's[1] 31 cases were included in a total of 306 infections and injuries of the extremities observed at the Hand Clinic of the General Surgical Dispensary of the Cincinnati General Hospital over an 18 month period. The incidence of 10.1 per cent is therefore somewhat selective. Other reported series, like my own, give no background statistics.

The incidence of infection in human bites is also uncertain. The great majority of reported cases, also like my own, are instances of late, neglected and infected bites. Lowry,[13] in his report of 28 infected cases from Beekman Hospital in New York mentioned "approximately 350" bites treated prophylactically over the same period (1933-1940) and estimated the incidence of infection as 3 per cent. I do not have the complete outpatient figures for the New Orleans Charity Hospital, but it is of interest that during the period from July 1, 1943, to June 30, 1947, 1,004 patients with human bites were treated in the accident room of the hospital. Only 2 of the 81 patients in my second series who were hospitalized for human bites over this period of time are included in the patients treated in the accident room. The statistics suggest, therefore, that it is mis-

management, plus the potentialities for harm inherent in them, rather than the actual incidence of infections and complications, which makes all human bites so serious.

Circumstances of Injury

Human bites are a type of injury seldom seen at private hospitals. They are chiefly seen at great public institutions such as the New Orleans Charity Hospital, the Detroit Receiving Hospital, and Beekman Hospital in New York. The latter hospital, Lowry[13] pointed out, is precisely the sort of institution at which this primitive type of wound might be expected. It is located near the waterfront of a great seaport and its population is drawn heavily from the derelicts who live along the docks and who are frequently involved in fights and drunken bawls. Such persons always comprise the largest number of those admitted for the treatment of human bites. The second largest number consists of the police who must control them and who are bitten in the process.

In my first report on human bites from the New Orleans Charity Hospital I commented, with some surprise, on the small number of reports from the South. Up to that time this category included only Colby and Barr's[15] report of 4 cases (2 in negroes) from Beaumont and Boland's[16] report of 60 cases in negroes from Atlanta. Sixty of the 90 patients in my own first series were negroes, as are 62 of the 93 patients in my second series. Since my first report was made, in 1941, there have been no other reports from the South, though negroes are mentioned in some of the cases reported since then. The largest number, 19, was included in Miller and Winfield's[14] 61 cases from the Detroit Receiving Hospital.

Another matter for surprise is the fact, commented on by Andreasen,[12] that no reports on human bites had been made since the outbreak of World War II although, because of the brutal hand-to-hand fighting which frequently occurred, a large number might have been expected. As a matter of fact, there have been reports of such cases in the American literature, but they number only 4 in all,[8-9] exclusive of a self-inflicted bite of the cheek.[7] It will be interesting, when the final statistics of the Armed Forces are published, to see whether this situation still holds.

Certain other curious aspects of human bites might be mentioned. One is the small number of cases recorded from mental institutions, from which one might reasonably expect a fairly large number of both aggressive and self-inflicted bites to be recorded. One of the patients in my own second series was bitten by her daughter, who had been released from a mental institution only a short time before.

A second curious aspect of human bites is the extremely small number recorded as inflicted by young children. One of the bites in my own second series was inflicted on the abdomen of a 7 year old child by her 2 year old cousin, who herself had been bitten by a dog, then under observation for rabies, the day before. Healing was prompt following excision of the wound, suture, the application of zinc peroxide, and the administration of tetanus antitoxin and neoarsphenamine. Smooth recovery is, in fact, the course of most bites by young children. One reason is the obvious one, that they are ordinarily inflicted on the fleshy parts of the body, in which infection does not occur as readily as in the hand. The second reason is that when children are in the age period in which they are inclined to bite freely, their mouths seem to contain fewer organisms than the mouths of adults.

Finally, it is curious that only a small number of cases have been recorded in which nail-biting, finger-sucking and similar habits resulted in infection. I quite agree on that point with Ronchese,[17] who, in an article devoted to this type of injury, took me to task for ignoring it in my first report on human bites. There were, however, no instances of wounds of this origin in that series nor in the series now being reported. Ronchese's theory that nail-biting is seldom followed by infection because of the antiseptic power of the saliva seems somewhat at variance with the theory that the organisms in the mouth are responsible for the severe infections which follow tooth wounds.

In the present series of human bites from the New Orleans Charity Hospital one man was injured when he "accidentally hit a friend in the mouth." Three men were bitten during hold-ups of which they were the victims. A negro woman, in her own words, was "beaten up by three men and eaten up" by a fourth. Three children, 8, 12 and 13 years of age respectively, were bitten by playmates. All these injuries were on the face and all healed without complications. A white man was injured when he hit his wife in the mouth; it seems poetic justice that he developed a rather serious infection as a result. Two colored women were bitten by their husbands. A 23 year old negro girl was bitten by a drunken girl friend whom she was escorting home from a christening. A 26 year old white man, sitting in a moving picture show in Atlanta, was bitten by the woman next to him "for no reason at all."

The majority of the bites in this series, however, were suffered in fights and drunken brawls, in which other injuries, such as stab wounds, head injuries and broken bones were frequent also. Colored women often bit each other in quarrels over men. One patient in the series had a history of morphine addiction. Another had been

in and out of the hospital for years for injuries sustained in accidents and fights, in one of which he had lost an eye. Three patients with serious hand infections developed them in jail, to which they had been taken for their share in the fights in which they were bitten. One man who had been involved in a free-for-all at a drinking party discovered, while he was washing his face later, that his ear had been almost bitten off. In this connection, one might mention, for what it is worth, an account in a New York paper of a policeman whose ear was completely bitten off while he was making a traffic arrest. When the loss was discovered, fellow officers searched for and found the ear, which was sutured in place. The final outcome was not stated.

The single self-inflicted bite in the present series from the New Orleans Charity Hospital is unusual enough to report in detail:

CASE 1. A 36 year old white woman was brought into the hospital by ambulance with the story that, being awakened from sleep by a severe coughing spell, she found herself spitting up blood and lying in a pool of blood which had dripped onto the floor. She was extremely pale, the blood pressure was 90/72, and she seemed on the verge of shock. Ruptured esophageal varix seemed an obvious diagnosis until the history was investigated, when the following account was obtained:

About 10 days earlier, during a drinking bout, the patient was pushed from behind and fell against a fire plug. The force of the fall knocked her upper bridge out and drove it against the cheeks with such force that the teeth were driven completely through to the exterior, at the angles of the upper lip. There was a moderate amount of bleeding at the time, and considerable soreness for the next day or two. By the end of the third day the wound on the left was apparently healed. The wound on the right, however, became swollen and discharged pus and dark, foul, bloody material, which nauseated her if it was swallowed. Then this wound apparently healed also. The hemorrhage described had followed a second drinking bout several hours earlier.

Examination revealed an infected, tender mass in the lower right cheek, just above the angle of the jaw. Immediately below this mass was a laceration 0.5 cm. long, which oozed foul, thick pus and dark blood and which was continuous with a similar laceration inside the mouth. A similar laceration, fairly well healed, was observed on the left side. The cervical and submental lymph nodes on the right were enlarged and tender. The hemoglobin was 11.5 Gm. and the red blood cells numbered 3,950,000.

Therapy consisted of transfusions, infusions, sedation, sulfadiazine by mouth and cleansing mouth washes. The infection rapidly subsided under this regimen.

In this connection there comes to mind the case reported by Collon[7] in which biting of the cheeks caused considerable diagnostic difficulty in a member of the Armed Forces. This 23 year old man complained of an extremely sore mouth, which had been present for 10 months and which was always worse after Pacific landing opera-

tions. Examination showed the mucous membrane of each cheek to be ragged; patches of gray, elevated tissue were present, and there were small denuded areas with congealed blood on the surface. The only relevant fact in the previous history was that the patient smoked. A diagnosis of leukoplakia was made and he was treated, without improvement, by numerous medical and dental officers, and finally a skin specialist, with gentian violet, silver nitrate, vitamins, various mouth washes, penicillin, and injections of bismuth. Eventually the man was evacuated to the Zone of Interior, where a dental officer made the diagnosis of cheek-biting and confirmed it by wiring the jaws together and limiting the diet to liquids. Within three days the patient was well on the way to recovery. This was definitely not an instance of malingering: The man was most cooperative throughout the investigation and was restored to full duty when the diagnosis was established.

Regional Distribution of Bites

Of the 126 bites sustained by the 93 patients in this series (fig. 1) 79 affected the hand and 47 affected the other portions of the body, including the forearm, arm, shoulder, various portions of the head, and the breast, chest and abdomen. Of the 79 injuries affecting the hand, 22 were caused by what Boland[16] called "the more civilized method" of striking an opponent in the mouth, in one instance with such force that two teeth were knocked out. In 4 cases in this group the blow was apparently of the glancing type, since all the metacarpal prominences were injured. Fifty-two patients had multiple bites, the numbers in these cases ranging from 2 to 5. The patient with 5 bites suffered 3 on the chest, one on the left shoulder and one on the left fourth finger.

The statement is usually made that bites on parts of the body other than the hand are less dangerous than bites on the hand, and, generally speaking, it is correct. Such bites, however, are not entirely free from dangerous consequences. The infection and hemorrhage which followed a bilateral bite of the face by false teeth in one case in this series have already been mentioned. Several patients with bites on the nose, lips, cheeks and chin developed serious infections, these areas, it being scarcely necessary to point out, being dangerous areas of the face.

Henry[8] mentioned a case in which a bite on the outer canthus of the eye, with a deep laceration of the lid, was sutured primarily, to prevent scarring, and was followed by a deep, anaerobic, sloughing infection which terminated in enucleation. Robinson[10] reported an instance of actinomycosis following a human bite of the forearm and mentioned the similar cases reported by Cope in 1915 and by

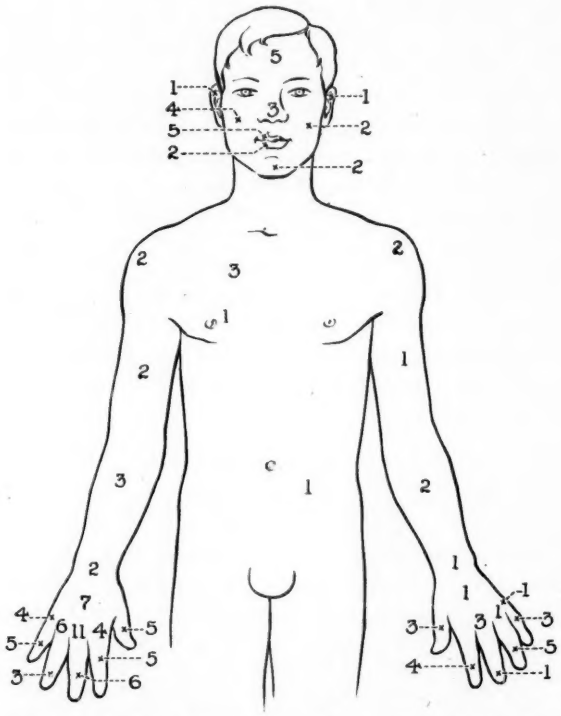

Fig. 1. Regional distribution of 123 human bites. The series consists of 126 bites in 93 patients, but two bites on the buccal mucosa and one on the palmar surface of the left hand are not shown in the diagram.

McWilliams in 1917. Robinson's explanation of his own case was that the iodine poured over the injury, when it was inflicted two and a half years earlier, probably resulted in devitalization of the tissues, and that the recurrent abscesses which had occurred at intervals thereafter had never been properly drained. Sylvestre Begnis and Picena[11] reported a fibrosarcoma of the Darier type which developed in the scar of a bite above the left nipple. The bite had been sustained 9 years earlier and the tumor, which had first appeared 5 years afterward, had then been excised as a benign cyst.

The following histories are related to prove the point that bites in areas other than the hand are not always harmless:

CASE 2. A 32 year old man engaged in a fight in the morning with the brothers of a woman with whom he was having an affair and received a cut over the eye. That evening the woman's husband "almost bit his nose off." Considerable free bleeding was checked by the application of sutures by a local physician and the patient was brought to New Orleans by ambulance.

Examination showed the nose to be badly mangled. On the left, all the tissues were completely separated, including the nasal cartilage. On the right, the cartilage was only partially severed but all other tissues were separated. The nasal bone was exposed for a distance of half an inch and all skin and subcutaneous tissues were missing over the distal two thirds of the nose.

The nose was thoroughly cleansed with soap and water by an aseptic technic for 45 minutes. All external defects were then sutured anatomically as well as possible by an atraumatic technic. The patient was given antitetanus serum and neoarsphenamine. Postoperative treatment consisted of sulfathiazole by mouth and the local application of sulfathiazole ointment, sulfanilamide powder, and sulfanilamide mesh dressings. For the first 3 days the temperature rose daily to 102° F. but thereafter recovery was smooth. When the patient was discharged on the twelfth day, healing was satisfactory but the nose was seriously disfigured. An appointment to return for plastic surgery was not kept.

CASE 3. A 26 year old white man was bitten on the flexor aspect of the left forearm a week before he was seen at the New Orleans Charity Hospital. The physician whom he consulted gave him an injection (presumably tetanus antitoxin) and recommended hot soaks. He did not cleanse the wound. The wound became increasingly painful and tender, and for 3 days before he entered the hospital the patient experienced marked malaise.

On his admission the temperature was 99.2° F. Examination revealed a laceration on the flexor aspect of the left forearm, just below the elbow, about ¾ inch long, with gaping edges. The tissues adjacent to the laceration were red, swollen, hot and extremely tender. The epitrochlear and axillary lymph nodes were enlarged, warm and tender.

Treatment consisted of sulfathiazole by mouth, compresses, and neoarsphenamine. Recovery was smooth. The patient was discharged from the hospital on the fourth day and from the outpatient dispensary 2 weeks later.

BACTERIOLOGY

The idea has long since been abandoned that infection which follows human bites is caused exclusively by the fusiform bacillus of Vincent. Studies have shown in these wounds, as in the human mouth, a variety of organisms, the most important being the aureus and albus varieties of *Staphylococcus,* the nonhemolytic, viridans and microaerophilic varieties of *Streptococcus, Bacillus proteus and Bacillus subtilis,* in addition to fusiform bacilli and spirochetes. It is now generally believed that the possible serious consequences of human bites are the result of a combined infection in which the fusiform bacillus and the spirochete, in symbiosis, play the chief role but in which other organisms are also concerned.

The second Charity Hospital series, like many other recorded series, contributes nothing to the bacteriology of these injuries. None of the biters were examined. In the few studies made, *Staphylococcus aureus* and *Staphylococcus albus* were most frequently found, in several instances combined with *alpha Streptococcus* and

in one instance with *Bacillus proteus*. Darkfield examinations were not carried out. This is unfortunate, in view of Miller and Winfield's[14] observation that the fusiform bacillus and the spirochete of Vincent can be detected in fresh wet smears in a large proportion of these cases. Lowry,[13] however, in an 18 month study, found no difference in the variety of organisms regardless of whether aerobic or anaerobic cultures were used, and smears furnished no additional information.

Womack,[5] in a discussion of my own first report on human bites, mentioned interesting studies made by Varney. The latter observer had found that *Bacterium melaninogenicum* was responsible for the fetid odor of pulmonary suppuration, and in a study of human bites in which necrotic tissue was present he found the same organism, which, like Vincent's organism, grows only in symbiosis. Its presence offers a reasonable explanation of the odor associated with many human bite infections, the resemblance of which to the odor associated with pulmonary gangrene has frequently been commented on.

Pathologic Process in Bites of the Hand

The description of the lesion in human bites of the hand, as well as the explanation of the spread, was originally recorded by Mason and Koch[4] and has never been improved upon. In substance, it is as follows:

The only protection of the metacarpophalangeal joints consists of the skin, the extensor tendons, which have no sheaths, and the joint capsules. The relations of these various structures differ according to whether the fist is clenched or the hand is extended. When the fist is clenched, the extensor tendons are stretched over the joints and any trauma which breaks the skin is quite likely to affect the underlying tendon and joint capsule or the metacarpal bone itself. A human bite sustained by a blow of the fist against the teeth may therefore damage an extensor tendon, sometimes completely severing it, may fracture a metacarpal bone, and may directly penetrate a joint capsule.

When the hand is extended after the injury, the anatomic relations of the parts are immediately altered. The injured surfaces are for all practical purposes buried under overlying tissue. The result is exactly the state of devitalization of tissue and anaerobiosis in which the fusiform bacillus and the spirochete thrive best in symbiosis. The tendons have a poor blood supply, very little resistance against infection, and no power of regeneration. Furthermore, the organisms of the human mouth which have been deposited within

the injured area are already acclimated to growth in human tissues and fluids, and therefore can proliferate and become invasive almost as soon as they are deposited. They are thus already thriving before the defenses of the host can be mustered against them.

In injuries of this sort infection is likely to spread, in order of frequency, to the subcutaneous space, the subfascial space, the subaponeurotic space, the metacarpophalangeal joints, the fascial spaces of the palm, and the flexor tendon sheaths. The pathologic processes which may occur alone or in combination include soft tissue necrosis, abscess formation, cellulitis, tenosynovitis, lymphangitis, lymphadenitis, periostitis, osteomyelitis, septic arthritis and sinus formation. The pathologic eventuality depends upon the point of invasion, the anatomic route of spread, the virulence of the infecting organism, and the time at which the patient is seen.

Injuries of the fingers, though less serious than injuries of the dorsum of the hand and the metacarpophalangeal joints, may progress in the same manner as injuries of those parts. Differences in the lesion are simply conditioned by differences in anatomy. In amputating wounds and avulsive bites infection is likely to be less severe than in other bites because there is free bleeding and the wound is exposed to air; anaerobic organisms thus do not find a favorable habitat.

In this second series from the New Orleans Charity Hospital, as in the first, the pathologic processes observed included soft tissue necrosis, cellulitis, tenosynovitis, abscess formation, thenar and palmar space infections, and dorsal subcutaneous and subaponeurotic space infections. In 2 instances a tendon was necrotic and in one instance the tip of the fifth finger had been bitten off. Fractures were observed in 4 cases and dislocation in one case as part of the original injury. On the whole, however, the infections in the second series seemed somewhat more localized and less severe than those in the first series, as will be pointed out later. Bone involvement, moreover, was observed in only 4 of the 93 cases, in contrast to 28 of the 90 cases in the first series.

Clinical Picture and Diagnosis

The clinical picture of a human bite depends upon the time at which it is seen. If the patient seeks aid soon after the injury, the wound may appear as a mere abrasion or contusion, or the actual teeth marks may be evident. If they are not, diagnosis depends upon whether or not the patient tells a truthful story of the injury. My own opinion is that the great majority of persons on the social level on which such injuries occur have few reticences in the matter.

On the other hand, the consequences of an erroneous diagnosis and of consequent incorrect treatment may be so serious that in doubtful or suspicious cases it is probably wise to consider all injuries in the metacarpal areas of the hand, at least, as bites until they are proved to be of other origin.

If the patient is seen at a considerable time after the injury, diagnosis frequently depends entirely upon his story because the pathologic process present frequently obliterates the signs of the original injury. Objective findings often appear in a surprisingly short time after the injury. Inflammation and marked edema are present within a few hours. An established tenosynovitis, as in the following case, may be present within 10 hours:

CASE 4. A 47 year old white man was seen 10 hours after a fight in which he had suffered a bite of the dorsal and palmar surfaces of the right middle finger. He complained of severe pain and stated that he had fever (the temperature was then 99.8° F.) and had had 2 chills. The hand was hot and swollen and the affected finger, which presented tooth marks in the middle phalanx, was reddened, hot, swollen and extremely tender, especially at the base. Red streaks extended halfway up the forearm. The epitrochlear and axillary lymph nodes were enlarged and tender.

Under pentothal anesthesia, incisions were made in each aspect of the finger and packs were inserted. A well established tenosynovitis was found. Other treatment consisted of sulfadiazine by mouth, penicillin by the intramuscular route, and hot soaks. Drainage was free. The temperature was 101.8° F. and the infection was still uncontrolled when the patient left the hospital against advice on the fifth day.

He returned a month later, with the story that the incisions had ceased to drain and slowly healed but that pain had been continuous and had been extremely severe since he had struck the same finger in a fight 3 days before. Examination showed it to be red, swollen, glistening and tender. Roentgenologic examination revealed sclerosis of the cortex of the middle phalanx, compatible with a periosteal reaction, with no evidence of bone destruction. Treatment consisted of local heat, hot soaks, and penicillin in the amount of 3.010,000 Oxford units. The patient was discharged on the eighth day. At this time the finger was practically normal in size and was no longer inflamed but was stiff and motion was limited. Physiotherapy was declined and the patient will undoubtedly have permanent limitation of function.

The typical patient with a neglected or incorrectly treated human bite infection of the hand, especially if the metacarpophalangeal joints are involved, presents a swollen, tender, hot hand, the inflammation frequently extending to the wrist even when the injury is in the terminal phalanx of a finger. Swelling and tenderness are particularly marked in the area of the lesion. Pain is usually present, especially on motion, and is likely to be constant and severe. If pus formation has occurred the pain is of the throbbing type. The discharge is thin and grayish unless it contains blood. Then it is dark

and thick. It has a foul odor surprisingly like the odor of pulmonary gangrene or pulmonary abscess. The epitrochlear and axillary lymph nodes are usually enlarged and tender and are sometimes hot. When various parts of the face have been bitten the submental, cervical or auricular lymph nodes are similarly affected.

A constitutional reaction, of which malaise is the most prominent element, is noted in many instances of human bites, sometimes within 4 to 6 hours of the injury. In this series from the New Orleans Charity Hospital the temperature was elevated to 100° F. in 46 cases, to 101° F. in 7 cases, to 102° F. in 3 cases, and to 102.4° F. in one case. The pulse rate was frequently over 100 and in one instance was 120. In the small number of cases in which blood studies were made the white blood cell count was usually elevated but in no instance exceeded 17,000.

Seventy-four of the 93 patients in this series were seen late, the lapse of time for the entire series ranging from less than an hour to 22 days, exclusive of one patient with a bite of the nose who came in 72 days after injury for plastic surgery, which had to be carried out in three stages. The 19 patients seen within 6 hours of injury included 3 with bites of the face, 5 with bites of the arm, chest, breast or abdomen, 7 with bites of the fingers, and 4 with bites of the knuckles. In at least 6 of the 19 patients seen within the 6 hour period, infection seemed already to be established. Although I have retained the classical 6 hour lag between injury and infection in this tabulation, I am inclined to agree with those observers who take the position that in human bites, infection is frequently established earlier.

Therapy

Treatment Prior to Hospitalization. A number of the patients in this series who were seen late had applied iodine or some other antiseptic solution to the injury soon after it had occurred—one wound had been cleansed with alcohol by the biter—or had washed it off superficially or had applied hot compresses. Only 14 of the 74 seen later than 6 hours after the injury had, however, had any formal previous treatment. Five had been seen by private physicians and 9 in the Charity Hospital accident room.

One of the private physicians had thoroughly cleansed the wound with soap and water before immobilizing it. Another had told the patient, whom he saw on the third day after wounding, that he had an extremely dangerous condition and had suggested that he enter the hospital at once. The other three physicians seemed to have no concept of the dangerous potentialities of human bites. They had

merely applied antiseptic solutions superficially and bandaged the wounds casually.

Of the 9 patients seen in the Charity Hospital accident room, one, who was seen on the sixth day of injury, was submitted to incision and drainage, which failed to control the infection. The remainder were seen within a few hours of injury. Six of these 8 were given antitetanus serum and were advised to soak the hand and use compresses. One was also given a sulfonamide drug. The seventh patient was treated with nitric acid followed by sodium hydroxide, and in the eighth case the injured knuckle was sutured primarily. Except for the last 2 cases, it is doubtful that the previous treatment, while it proved to be inadequate, did any actual harm.

Treatment of Early Cases. Almost all of the 19 patients in this series who were hospitalized within a few hours of injury were treated in the same manner: The wounds were thoroughly cleansed with soap and water, neoarsphenamine and antitetanus serum were given, and the patient was placed on a sulfonamide, usually sulfathiazole, or on penicillin, or on both. One wound was cauterized with the actual cautery and another with nitric acid. Local measures included compresses, massive dressings, drips and irrigations. The chief agents used were boric acid, azochloramid, and peroxide of hydrogen. Zinc peroxide was occasionally used.

With a single exception, described in the following case history, recovery was prompt and function was unimpaired in these 19 cases.

CASE 5. A 27 year old colored man was seen 6 hours after he had struck another man in the mouth and had sustained an injury of the fourth (ring) metacarpophalangeal joint. Examination showed a traumatic incision ½ inch long extending down to the joint capsule. The tendon did not seem to be damaged. The ring and the little finger were both swollen and reddened. The temperature was 99.6° F. Roentgenologic examination of the hand revealed no evidence of bony injury. Systemic treatment consisted of neoarsphenamine, antitetanus serum and sulfadiazine. Local treatment consisted of hot soaks and a drip of azochloramid through a Dakin tube.

The infection was not controlled by this regimen, the temperature rose daily to 102° F., and debridement was therefore carried out 3 days later, under general anesthesia. The head of the fourth metacarpal bone was found necrotic and was removed, together with all necrotic soft tissues. The preoperative regimen was continued after operation and recovery thereafter was smooth except for a single temperature elevation to 102.8° F. The patient was discharged on the twelfth postoperative day and was refererd to the physiotherapy department for treatment, which he continued for only a month. When he was last seen he had almost complete limitation of motion in the fourth finger.

Treatment of Late Cases. The treatment of the 74 patients seen

late was guided entirely by the conditions present. Debridement was necessary in 7 cases and incision and drainage in 13, in 2 of which secondary incision was required; both debridement and drainage were carried out in 5 cases. Four wounds were sutured, in one instance the sutures being left untied, and secondary suture was carried out in one case. Other surgical measures included amputation of a phalanx, disarticulation of a finger, and excision of a metacarpal head in one case each. Grafts were applied as a delayed measure in 4 cases.

In these cases, as well as in most of the remaining cases treated without surgery, the therapeutic regimen included sulfathiazole (or sulfadiazine) or penicillin, or both penicillin and a sulfonamide, by mouth. Antitetanus serum and neoarsphenamine were used in numerous cases. Local treatment consisted, as in the cases seen early, of compresses, massive dressings, soaks, drips and irrigations, the solutions used being those already listed. In addition to their systemic administration, sulfanilamide was used locally in 4 cases, penicillin in one, and neoarsphenamine in 5. Heat was applied in most cases by various methods.

Transfusions and infusions were used in one case, infusions in one, and tube feeding in one, the latter being an infection of the dangerous area of the face.

Sympathetic blocks were used in one case. This form of therapy is interesting in view of the instance of minor causalgia reported by Homans[6] following a human bite. The typical syndrome developed two and a half months after a mother had been bitten by her child, whose age was not specified, at the base of the right forefinger. Relief was obtained by sympathetic block and permanent cure was achieved by the use of intermittent venous hyperemia.

Evaluation of Therapy

Charity Hospital at New Orleans has no formal follow-up system, but the poor results following human bites in the series of 90 cases reported in 1941 can be gathered from the fact that the surgery necessary included osteotomy in 3 cases, partial amputation of a finger in 3 cases, complete amputation of a finger in 21 cases, in 4 instances associated with partial amputation of the corresponding metacarpal bone, and amputation of the arm in one case. One patient died of pneumonia, on the eighty-eighth day after the injury, following 3 operations to control the infection. In the second series there were no deaths and actually mutilating operations were necessary in only 3 instances.

The multiple methods of treatment used in practically every case

in the second series (as in the first) makes evaluation of any single method of treatment difficult if not impossible. There are, however, several possible explanations of the better results in the second series:

1. The patients in the second series were seen, on the whole, earlier than those in the first series, and therefore, as has been pointed out, infections were more localized, while involvement of the bone was unusual. In both series such previous treatment as had been applied in delayed cases erred chiefly on the side of conservatism and did little active harm.

2. Agents used locally were much the same in both series. In the second series, however, because the infections were on the whole more localized and because the patients progressed well under non-surgical measures, or simple surgical measures, radical surgery was less often necessary and preservation of function was more often possible.

3. The resident staff, by which the injuries in both series were chiefly managed, seemed to have a better appreciation in the later series of the potential seriousness of human bites. This appreciation was expressed in several ways. A recent, and most important, way was the growing tendency to admit patients with this sort of injury to the hospital for a 48 hour period of observation after initial treatment.

Another expression of appreciation of the possible seriousness of human bites was the curious practice of administering antitetanus serum and neoarsphenamine to these patients, which I interpret as over-treatment. It is generally admitted that tetanus does not follow human bites—so far as I know, the sequence has never been reported—and the use of neoarsphenamine had been generally discontinued, in Charity Hospital and elsewhere, at the time of my first report in 1941. Reactions did not follow the use of either measure in this series, and neither, therefore, did any harm, but in my own opinion both are entirely unnecessary.

4. On the basis of the analysis of this series of cases, and of personal observation of a large number of such injuries, my own opinion is that the chief difference in the results of the two series can perhaps be explained by the chemotherapeutic and antibiotic agents which were used separately or in combination in 66 of the 93 cases in the second series, including practically every recent case. In view of the lack of bacteriological studies, this must remain merely an opinion, and a *post hoc ergo propter hoc* opinion at that, but it seems reasonable to postulate that the control of organisms sensi-

tive to these agents destroys the symbiosis in which Vincent's organism and the spirochete co-exist and thus controls the infection.

Ideal Methods of Treatment

The ideal treatment of a human bite seen early (certainly within 3 or 4 hours of injury) would seem to include:

1. Cleansing for at least 10 minutes with soap and water by an atraumatic technic, followed by thorough irrigation of the wound with physiologic salt solution or clear sterile water.

2. Determination of the depth and character of the injury by gentle retraction of the wound edges, without probing. Speirs'[15] suggestion that the patient be asked to make a fist, to bring the tendon into view and reveal possible injury of the joint space, is frequently useful.

3. Splinting of the hand with massive dressings in the position of function, followed by the application of moist heat, if no surgery is indicated. The surgeon may use whatever agent he prefers, but in the opinion of many observers, of whom I am one, physiologic salt solution is as effective for drips, compresses and irrigations as any antiseptic solution.

4. Excision of devitalized tissue well beyond the area of injury if debridement is indicated. General anesthesia is used and the blood supply is cut off by a tourniquet, which is maintained in place as short a time as possible. Debridement is as thorough as necessary while at the same time it is as conservative as possible, because there is little tissue in the hand which can be excised without damage to function. No attempt is made at this operation to repair injured tendons or carry out plastic procedures.

5. Hospitalization of the patient for at least 48 hours, or as much longer as is necessary to determine that infection will not occur. If for any valid reason the patient cannot be hospitalized, he should be required to return daily for examination and dressing. Hospitalization should be routine and without exception for patients with joint involvement.

6. The administration of both sulfathiazole (or sulfadiazine) and penicillin, on the ground that these agents supplement each other in the control of different types of organisms.

The management of a patient seen late should follow the general principles of cleansing, examination, splinting, and postoperative treatment which have just been outlined. The operative procedure depends upon the findings and should take the form of debridement, removal of sutures, incision and drainage, or whatever may be re-

quired. The anatomic principles which would be followed in any other type of hand infection should be observed, and incisions, for the sake of future function, should be as conservative as is consistent with adequate drainage. Amputation should be resorted to only when no other procedure will serve.

Lowry[13] has reported excellent results with cauterization of human bites with fuming nitric acid, followed by flushing with cold water, wet dressings and immobilization. He employs this method even when the teeth have entered the joint or the tendon sheath. In spite of his good results, and the similarly good results reported by Bates[19] with electrocauterization, I should hesitate to recommend either method for general use; if not used properly, both would seem to create the very state of anaerobiosis and tissue destruction in which certain bacteria thrive.

There is also no doubt that primary wound closure is definitely contraindicated in human bites for the reason just stated. Henry[8] has reported instructive comparative illustrations:

1. A sailor, bitten on the dorsum of the hand, was seen two weeks after the wound had been closed by primary suture. The wound was sloughing and exuded foul pus when the sutures were removed. The subsequent course of events included an undermining, necrotic, deep-seated ulcer, slough of the tendons, and osteomyelitis at the site of the bite and in the proximal phalanx of the fourth finger. Extremely slow healing followed drainage, irrigations with peroxide of hydrogen and Dakin's solution, and the local application of sulfa crystals.

2. A similar injury in another member of the Armed Forces was also sutured primarily by a civilian physician. When the patient was seen shortly afterward, the sutures were at once removed and the tissues were spread apart. Daily hot soaks and irrigations with peroxide of hydrogen resulted in uncomplicated healing within 15 days.

Summary and Conclusions

1. To the approximately 800 cases of human bites already on record in the literature, including 90 previously reported from Charity Hospital of Louisiana at New Orleans, a second series of 126 bites in 93 patients is added from the same institution.

2. This second study confirms in general the conclusions arrived at in the first study, especially the potential seriousness of all such injuries and the great dangers of improper treatment.

3. The immediate results in the second series were far better

than in the first, apparently because (a) the patients were seen earlier, so that the incidence of serious infection was less; (b) residents seemed to be developing a wholesome respect for this type of injury; and (c) the sulfonamides and penicillin were effective in limiting the spread of invasive infection. The latter conclusion is added with some hesitation, because of the lack of bacteriologic studies, but is nonetheless believed to be correct.

4. The treatment of human bites seen shortly after occurrence is based upon the conversion of the anaerobic state to an aerobic state and the excision of devitalized tissue in which bacteria might grow in symbiosis. Debridement, however, should not be performed unless it is indicated. Treatment of late cases depends upon the conditions present and should be as conservative as is consistent with safety. Both early and late cases should be treated with massive dressings to secure immobilization in the position of function, moist heat, and the systemic administration of penicillin and a sulfonamide.

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GASTROSTOMY AND INTESTINAL TUBE FEEDINGS AS AN AID IN GASTRIC SURGERY

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Two of the most difficult problems in the postoperative care of patients who have had gastric surgery are the maintenance of an adequate nutritional status and the decompression of those portions of the gastrointestinal tract adjacent to the anastomosis. The use of a gastrostomy and intestinal tube feedings has done much to solve these problems.

We will present as illustrative cases 5 instances in which these procedures were used. These cases are from our service at the Spartanburg General Hospital during a period of 8 months.

The type of gastrostomy used is simply a soft rubber catheter inserted into the stomach through a stab wound and anchored with an absorbable suture material and then brought out through the abdominal wall by means of another stab wound. The tube for intestinal feedings is a Levin tube which is inserted and anchored in a similar manner in the stomach and passed down through the anastomosis into the jejunum for a distance of about 3 feet.

Case Summaries

Case 1. (131,940) White male, aged 52.

Diagnosis: Adenocarcinoma of stomach.

Duration of Symptoms: 18 months; 50 pounds weight loss.

Operations: Partial gastrectomy. Tube gastrostomy—catheter anchored in stomach (see fig. 1).

Hospital Course: Out of bed on 2nd postoperative day. Started on progressive Sippy diet on 4th postoperative day. Sutures removed on 15th postoperative day, and patient discharged.

Results: Patient in excellent condition on discharge, has been seen at monthly intervals since and is doing nicely, having gained about 25 to 30 pounds. He has now resumed his normal work.

Case 2. (145,782) White male, aged 26.

Diagnosis: Recurrent jejunal ulcer (he had had a gastroenterostomy at the age of 18).

Duration of Symptoms: Ulcer pain about 2 to 3 times a year for preceding 8 years.

From the Department of Surgery, Spartanburg General Hospital.
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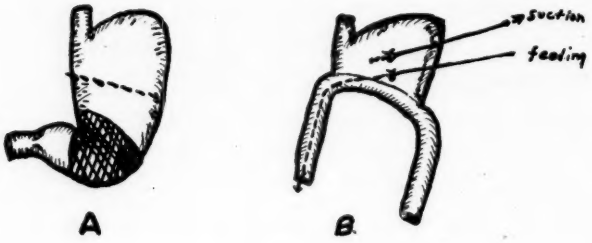
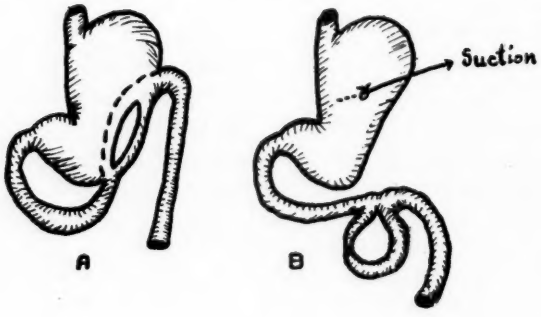


Case 1



Case 2

Operations: Lysis of gastroenterostomy. Entero-enterostomy. Tube gastrostomy—catheter anchored in stomach (fig. 2).

Hospital Course: Patient developed a respiratory infection on first postoperative day, responded well to penicillin parenterally and by nebulizer. Strict Sippy diet started on 4th postoperative day; patient out of bed the following day. Sutures removed on 10th postoperative day. Patient wanted to leave catheter in place, so it was removed in office one week later.

Results: Patient in good condition on discharge, has continued to do nicely and is back at work regularly.

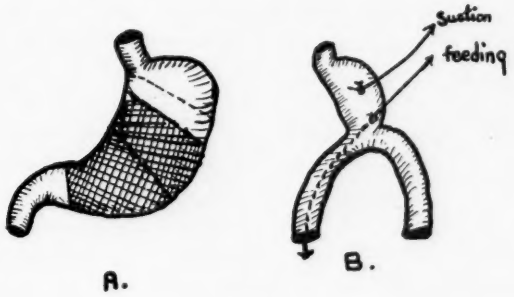
Case 3. (11,548) White female, aged 53.

Diagnosis: Schirrous carcinoma.

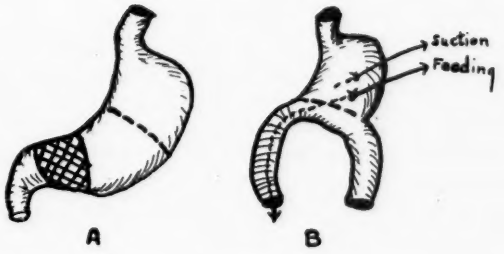
Duration of Symptoms: Approximately 2 months.

Operations: Gastrectomy with preservation of fundus pouch. Catheter anchored in pouch (fig. 3). Levin tube passed through pouch into jejunum (fig. 3).

Hospital Course: Out of bed on 4th postoperative day. Oral feeding begun on 12th postoperative day, sutures and tubes removed on 14th day, and the patient discharged on the 16th postoperative day.



Case 3



Case 4

Results: Good condition on discharge, gaining weight and has resumed household duties.

CASE 4. (73,276) White male, aged 73.

Diagnosis: Linitis, plastica of the stomach.

Duration of Symptoms: Approximately 2 weeks.

Operations: Partial gastrectomy. Tube gastrostomy—catheter anchored in stomach. Levin tube passed through stomach into jejunum (fig. 4).

Hospital Course: Out of bed on 2nd postoperative day. Oral feedings started on 5th postoperative day. Patient had considerable nausea and vomiting 4 days later and suction and tube feedings were re-started. One episode of moderate hematemesis. Tubes removed on 14th postoperative day. Improvement gradual. Patient discharged 38 days after operation.

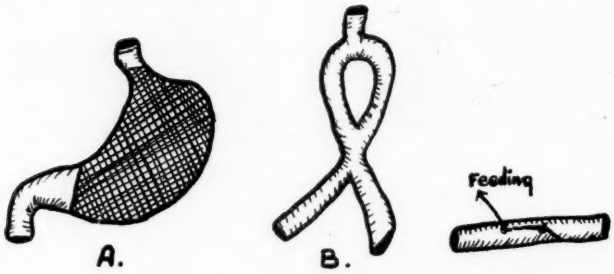
Results: Patient in good condition on discharge; has gained 30 pounds and has done nicely except for 2 episodes of gastroenteritis which followed dietary indiscretion. He has resumed part-time work.

CASE 5. (819,756) Colored male, aged 47.

Diagnosis: Adenocarcinoma of stomach.

Duration of Symptoms: Approximately 6 months. Weight loss of 75 or 80 pounds.

Operations: Total gastrectomy, transthoracic. Entero-enterostomy. Levin tube anchored in jejunum and passed down into the distal portion of jejunum (fig. 5).



Case 5

Hospital Course: Out of bed the day after operation. Condition very satisfactory. Started small amounts of fluid by mouth on 11th postoperative day, the tube being still in the abdomen and the patient receiving tube feedings in addition to small frequent oral feedings. Patient discharged on 34th day.

Results: Patient left hospital in good condition, has regained about 10 pounds. He is continuing combined oral and tube feedings at home. The tube will be left in until his diet by mouth is adequate.

In the cases presented as in most cases requiring gastric surgery, there is already a nutritional problem present prior to surgery due to the nature of the conditions requiring such surgical procedures. Consequently, we are concerned with preparing the patient preoperatively with fluids, electrolytes, concentrated proteins, vitamins, etc. In the postoperative period that nutritional status must be maintained if a satisfactory result is to be obtained. Feedings by mouth cannot be started for the first few days, so they must be provided by other means.

These essential factors may be administered by the intravenous route or by tube feedings either with a nasal tube passed down through the stomach on into the jejunum or by means of a feeding tube inserted into the jejunum and brought out through the abdominal wall by means of a stab wound. The intravenous route has certain obvious disadvantages in that the patient is subjected to numerous venipunctures and is compelled to lie in one position while the fluid is being given. Then, too, there frequently may be difficulty in starting intravenous fluids due to small and inaccessible veins especially in prolonged cases. The occasional anaphylactic protein reaction may occur.

The disadvantages of a nasal tube are largely the discomfort to

the patient, but there is also considerable irritation of the nose and throat, and one death was reported as the result of necrosis of the cricoid cartilage with a nasal tube.[1] The chances of developing a respiratory infection are increased with prolonged use of the nasal tube for, in addition to the constant irritation to the upper respiratory tract, the patient is unable to cough adequately.

The type of tube feeding used in this series of cases was very satisfactory. A Levin tube was inserted through a stab wound in the stomach after the posterior anastomosis was made and then threaded down into the distal portion of the jejunum for a distance of about 2 feet. It was then anchored to the stomach wall with an absorbable suture and brought out through the abdominal wall by means of a stab wound. In the case in which a total gastrectomy was done the tube was inserted by means of a Witzel enterostomy into the distal portion of the jejunum approximately 10 to 12 inches from the anastomosis of the two loops of the jejunum. All of these patients were quite comfortable in so far as the feeding tube was concerned, and no unpleasant effects were experienced. The tube can be easily removed after oral feedings are adequate. Usually, the anchoring suture has been absorbed and the tube is pulled out very easily. However, in one instance where cotton sutures were used for anchoring, it was necessary to apply gentle traction with rubber bands for a period of 24 to 36 hours, after which it was removed with ease.

The feedings consist of readily assimilated foods such as the prepared amino acids, glucose, and the liquid vitamins. We have found that a mixture consisting of glucose, powdered amino acids, and vitamins in water or normal saline is preferable to giving the liquid amino acids alone because occasionally some diarrhea would result. The feedings are usually given by the drip method, being careful not to overload the intestine by giving the solution too rapidly. The solution must be at body temperature when given. The frequency of the feedings and the amounts are determined for the individual patient. The sodium chloride intake should be limited to 9 Gm. daily.

Decompression of the stomach is most commonly achieved by means of the nasal tube and Wangensteen suction. The disadvantages of a tube through the nose have been discussed. The simple type gastrostomy used in the cases presented adequately accomplished decompression without the disadvantages of the nasal tube —as mentioned previously. A soft rubber catheter is inserted into the stomach through a stab wound and brought out through the abdominal wall by means of another stab wound. It can then be

attached to a suction apparatus and functions very satisfactorily. It can be very easily removed when no longer needed in a similar manner to that described for the feeding tube.

A double lumen tube has been advocated by some for both suction and feeding. This tube, however, is inserted through the nose and has the disadvantages previously mentioned.

Conclusions

1. A simple tube gastrostomy for decompression and a method of intestinal tube feeding avoiding the use of a nasal tube have been suggested as an aid in the postoperative care of patients who have been subjected to gastric surgery.

2. Five illustrative cases in which these procedures were successfully and satisfactorily used have been presented.

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EPITHELIOMA OF THE PENIS

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IT IS my intention to deal with the subject of epithelioma of the penis from a general standpoint. I will discuss briefly some of the pertinent points concerning the disease and illustrate them with case histories from the files of the Jackson Clinic. While the majority of my remarks are common knowledge to the urologist, I trust they will be of some interest and value to those of you who are engaged in the general practice of medicine. It is probably true that the treatment of epithelioma of the penis, once the diagnosis has been established, will seldom fall into the hands of the physician in general practice, but the fact remains that practically all epitheliomas of the penis are first seen by the patient's general medical adviser.

Each year there is a country-wide campaign designed for the education of the layman about cancer in general. It is my impression that at these times more emphasis should be given to epithelioma of the penis. In the light of our present knowledge of cancer, epithelioma of the penis is the only type that we can say with any degree of assurance can be prevented. It is therefore somewhat in a class by itself. This statement is so at variance with the statements usually made concerning cancer in general that it will be accorded considerable attention in this paper.

Epithelioma of the penis is not uncommon. Wolbarst, after a statistical study of data secured from hospitals all over the United States, concluded that a conservative estimate of the incidence of penile cancer was 2 per cent, or possibly 3 per cent, of all cancers in men and that it caused about 225 deaths annually in the United States. Ewing estimated that cancer of the penis represented 1 to 3 per cent of all cancers in the male. Lewis found that 3.5 per cent of 2,017 patients with malignant disease admitted to the Brady Urological Institute during a 15 year period had cancer of the penis. Pack and LeFevre observed that 100 patients with epithelioma of the penis admitted to Memorial Hospital in New York City represented 2 per cent of all tumors of the genito-urinary system and 1.25 per cent of all malignant tumors in males admitted during the same period.

Lenowitz and Graham reviewed the histories of 100 white and 39 negro patients with carcinoma of the penis admitted to Hines

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Veterans Hospital during the period 1931-1944. Negro patients constituted 28 per cent of all patients with carcinoma of the penis and about 4 per cent of all negro patients admitted with all types of tumors. Cutaneous carcinoma, excluding carcinoma of the penis, occurs only one seventh as frequently in negro as in white patients, and racially there is no appreciable difference between the incidence of cutaneous carcinoma of the covered skin in negro and that in white patients. Carcinoma of the penis, however, occurred about five and one half times as often in the negro as in the white patient. The incidence of carcinoma of the penis for both negro and white patients was approximately 1 per cent of all cancers in the male. The average time between the onset of the lesion in all cases and admission was twenty-one months.

The frequency and number of cases will vary, depending upon the type of institution. Deakin and LaForce reported 20 cases from the Barnes Hospital, St. Louis, Mo., during a 20 year period from 1917 to 1939 inclusive. During the same period another St. Louis hospital devoted to skin and cancer cases took care of 113 cases.

The majority of the cases occur between 40 and 60 years of age, the average being 50 years, but they are not at all uncommon under the age of 40. It is generally considered that such factors as nationality, trauma, and occupation are of no importance as etiologic factors, nor are previous constitutional diseases, with the exception of syphilis, considered important. It is thought that syphilis probably renders one more susceptible to the active factors producing the epithelioma. In general, no one in any social stratum is immune. The disease occurs more commonly, however, in the lower classes of society and among those likely to neglect themselves. It may be more prevalent in some countries; Noble found in his studies in Siam that 22 per cent of all cases of cancer in men were of the penis.

Concerning the etiology of epithelioma of the penis and its prevention, Dean and his associates after a study of 120 cases concluded that epithelioma of the penis is caused by the mechanical and chemical irritation of secretions retained beneath the prepuce. This opinion has been repeatedly expressed for many years and, so far as I know, there has been no evidence advanced to show that the conclusion is erroneous; yet little practical use has been made of the information. They further concluded that circumcision in early infancy affords complete protection against the subsequent development of penile cancer and that circumcision in early years gives relative protection, while circumcision of adults is of much less value as a prophylactic measure. In support of these conten-

tions, a review of several large series of cases revealed that approximately 95 per cent of the patients with this disease had long, redundant, phimotic prepuces. In Dean's series of 120 cases, no patient had been circumcised in infancy. Many other writers have reported the same finding.

It is well known that many epitheliomas of the penis begin to develop rapidly after a circumcision in adult life. This occurred in 4 of the 37 cases reported by Horn and Nesbit and in many cases in the series reported by Bowing, Fricke, and Counseller. Foulds and Stevens, Ormond and others have reported such cases. Many times the physician is blamed for not performing the operation properly, and the growth spreads extensively before its true nature is recognized. The following could have been such a case:

O. A., aged 56, consulted his physician in March, 1914, because of irritation about the prepuce and a small wart-like growth on its inner mucosal surface. The physician did a circumcision, and section of the lesion revealed an epithelioma. The circumcision healed but about 2 months later an ulcerated area developed, involving the coronal sulcus and extending backward onto the skin of the shaft of the penis.

He was referred to the Clinic in June, 1914. Examination disclosed an ulcerated, indurated area about the size of a quarter. There were few enlarged inguinal glands.

The penis was removed well proximal to the growth, together with some glands of the groins. Recovery was uneventful. Pathologic examination of the ulcerated area by C. H. Bunting showed an epithelioma. No pathologic examination was made of the glands removed. The patient was alive and well, 23 years following amputation of the penis. In this instance failure to send the small wart-like lesion for pathologic examination would probably have resulted in the patient considering that the original operation was not skillfully done, and he probably would have neglected the unhealed ulceration for some time.

The question as to why epithelioma develops in a patient years after circumcision has been performed is an interesting one, but space does not permit any lengthy discussion of it. *Several writers have called attention to the leukokeratosis which commonly follows. Most likely in such instances precancerous changes have already taken place, and probably the source of irritation is not entirely and adequately removed at operation performed late. Examples of such cases are the following:*

F. W. A., aged 69, entered the Clinic on May 30, 1926, complaining of frequency of urination and nocturia and also of a tight, irreducible, inflamed prepuce, which had bothered him for as long as he could remember. The general examination was negative. The prepuce was described as edematous, inflamed, adherent, and fibrotic; sclerosis of a small portion of the glans was noted. The meatus was pin-point in size. Hot dressings were applied, and on

June 8, 1926, a circumcision and meatotomy were done. The operative notes stated that as much as possible of the fibrotic, adherent prepuce was removed.

On Nov. 16, 1932, 6 years following the circumcision, at the age of 75, he came to the Clinic because of a fainting spell.

During the course of the general examination a growth was found on the glans penis, which he stated had been present for about 6 months and was not painful. Since he no longer indulged in any sexual practices, he considered the lesion of no moment, although it had been gradually increasing in size. The lesion was flat, about ¾ inch in diameter and raised about ¼ inch above the surface. It involved the skin, the sulcus, and the glans. The skin margin was rolled, hard, and nonfixed. The glans was infiltrated. The examination also disclosed hypertension and myocardial changes.

In view of the patient's age, radium and fulguration were advised, and a biopsy was performed under local anesthesia; the pathologic report showed a prickle-cell epithelioma. For various reasons, which I will not discuss in detail here, the penis was amputated; recovery from the surgery was satisfactory. Eight months after the operation he died suddenly from coronary disease.

Several precancerous and early malignant lesions of the penis are recognized and described clinically and pathologically:

(1) Erythroplasia of Queyrat. This lesion appears as a velvety, intensely red area on the glans penis. Single or multiple areas of ulceration may occur. This lesion is a dangerous one, and in some urologic clinics when the diagnosis is made, amputation of the penis is advised.

(2) Paget's disease of the penis. This lesion occurs as an erythematous patch. Ulceration ultimately occurs.

(3) Bowen's disease of the glans penis. This lesion is characterized by single or multiple, dull red, scaly or crusted, painful macules, papules, or nodules. The borders are rolled. These lesions may be associated with other varieties of skin tumors and may be present for many years before becoming malignant.

(4) Leukoplakia (leukokeratosis). This condition is characterized by glistening whitish thickening of the epithelium of the glans. *This lesion is not malignant but may be a forerunner of cancer as in the following case:*

J. J. H. (95003), aged 60, was seen at the Clinic on Feb. 19, 1939. The mucosa of the glans penis was pearl-gray, the meatus was partially closed with a thin membrane, and there was a phimosis that was difficult to reduce, with adhesions between the mucosa and the corona at the sulcus. On the dorsal aspect of the mucosa of the prepuce there was an area of induration and thickening, 1½ by 1½ cm. These changes had been present for some time, the patient having been observed at the Clinic for other conditions for several years previously. There were a few shot-like inguinal glands on both sides.

Circumcision was performed on Feb. 15, 1939. Sharp dissection was re-

quired, and a meatotomy was performed. The pathologic report from the tissue removed showed leukoplakia. During 1939 and 1940 superficial ulcers would appear at times in various places on the glans and heal spontaneously after the application of bland ointments. The mucosa was always dry, parchment-thin, and white to pearl-gray in color. On Jan. 20, 1941, there was inflammation of the glans of 2 weeks' duration. The left half of the glans was erythematous and slightly indurated, and there were 2 or 3 variable-sized hyperkeratotic areas which were firm and hard. A diagnosis was made of (1) leukoplakia and (2) epithelioma. After the application of boric compresses and bland ointments the inflammation rapidly subsided. On Mar. 27, 1941, a soft, nonindurated, pea-sized granular area on the left side of the glans was excised with the electrosurgical loop, and the base fulgurated. The pathologic report showed large alveoli with prickle cells, some mitotic figures, and some haziness of the stroma. The epithelial borders showed little keratinization. The diagnosis was early prickle cell epithelioma.

On May 16, 1941, a small area in the margin of the previously fulgurated area persisted. At this time the entire case was reviewed, and the question of treatment again discussed with the patient, who had been advised at the time of circumcision that he would probably develop an epithelioma. In view of the many factors, fulguration was again advised.

The left half of the glans, including the meatus and part of the urethra, was excised with the electrosurgical loop and the base fulgurated on Oct. 8, 1941. At the sulcus, ventral and to the left, was a granular keratotic area which was fulgurated. On Feb. 10, 1942, 2 matchhead-sized lesions and 2 superficial ulcerated areas were fulgurated.

On May 26, 1943, 2 superficial ulcerated lesions were fulgurated. The glans had flattened out and was quite symmetrical, even though the left half of the glans had been removed in 1941.

On May 16, 1944, a small squamous lesion on the left side of the meatus and another at the ventral coronal margin were fulgurated. When seen one month later these areas were healed.

On July 13, 1944, several papulovesicular areas on both sides of the glans were noted. By Oct. 25, 1944, these areas had increased in size. One lesion was indurated, and operation was again advised. On Nov. 17, 1944, amputation was performed by the Nesbit technic.

The pathologic report by C. H. Bunting was as follows: "The sections show a heavy layer of surface epithelium apparently of somewhat slow development and thus far rather well marked off from the underlying tissue (Bowen's disease). However, at present there seems to be active growth (many mitotic figures) and just beginning direct invasion of atypical cells to be regarded thus as showing a definite malignant tendency."

On Sept. 15, 1945, the glands in the groin were the same as before. There was no evidence of local recurrence. In October, 1946 and 1947, and January, 1948, the condition was the same, and there was no evidence of recurrence.

As previously stated, this case illustrates the development of malignancy following leukoplakic changes in the mucosa of the glans, even though the chronically inflamed phimotic prepuce had been removed by circumcision some time previously. It also demonstrates the generally slow-growing nature of the lesion.

Since there was no question as to the malignant nature of the lesions, it might well be asked why a more radical form of treatment was not employed at the outset. To answer the question would entail a too extensive discussion for inclusion in this paper. Suffice it to say, it was not unreasonable to assume that the lesions could be controlled by local electrosurgical excision and fulguration. Amputation was advised early, but the patient requested deferment.

In support of the contention that circumcision in infancy prevents epithelioma of the penis, is the well-known and, as Wolbarst states, little utilized fact that Jews do not have epithelioma of the penis. Dean reported a case of epithelioma of the penis in a circumcised Jew. However, his patient several years previously had a venereal sore on the glans penis which had been treated by actual cautery. He subsequently developed scarring at the meatus for which the passage of sounds was necessary; the neoplasm developed in the scarred area. In 1932 Wolbarst reported a case of epithelioma of the penis in an uncircumcised Jew and stated that, as far as he could determine, these are the only reported cases of epitheliomas of the penis in Jews.

It has been stated for years, and the statement may be found in many textbooks of urology, that Jews have a racial immunity to the development of epithelioma of the penis. It has been shown by investigators, Sorsby and Wolbarst, that Jews are as susceptible to epithelioma elsewhere in the body as any other race or nationality. It has been further shown by Sutherland, after a study at the Mayo Hospital in Lahore, Punjab, India, that Mohammedans, as compared to Hindus, rarely have epithelioma of the penis. The Mohammedans practice ritualistic circumcision between 4 and 9 years of age, while the Hindus do not. Reports can be found in the literature of a few cases of epithelioma of the penis occurring in Mohammedans and, as has been previously stated, this is probably due to the fact that precancerous changes have occurred before the circumcision is performed.

Spittel reported that carcinoma of the penis was an astonishingly common form of malignant disease seen in Ceylon. During a 4 year period he saw 91 cases. He stated that congenital phimosis was an almost invariable accompaniment. He never observed carcinoma of the penis in the Moors who practice circumcision.

As mentioned previously, epithelioma is often discovered at the time of circumcision when performed in an adult, or when dorsal slits are made in adults for the relief of inflammation and irritation of a redundant prepuce. *The growth of an epithelioma beneath the prepuce usually produces irritation, and it is the irritation which*

leads the patient to consult his physician. However, frequently the irritation is of no consequence and the lesion may manifest itself as in the following case:

O. C. J., aged 51, came to the Clinic on Dec. 24, 1936, complaining of bleeding from the side of the penis of several hours' duration. He stated that, as long as he could remember, he had had an irreducible prepuce. Ten days previously the penis and foreskin had become painful and swollen and had discharged pus. He thought the lesion was a boil and that it would subside of its own accord. Several hours prior to admission profuse bleeding had occurred from the ulcerated area, the bleeding occurring, as the patient stated, in spurts. It had been controlled by his local physician with some difficulty. The history also disclosed that approximately 25 years before admission he had had a ureteral calculus which had been manipulated cystoscopically and expelled. A roentgenogram of the kidney, ureter, and bladder areas on admission revealed a staghorn calculus in the right kidney.

At the time of examination the bleeding had entirely stopped, and the patient thought that no further treatment would be necessary. However, he was advised to have a dorsal slit, which was performed under gas anesthesia. This disclosed a polypoid tumor, 1 by 2 cm., arising from the mucosa of the prepuce adjacent to the sulcus. The base of the lesion had penetrated through the skin of the prepuce. There were several small palpable glands in the right groin. The entire lesion was excised. The pathologic report showed a squamous cell carcinoma, grade 1. The examination also disclosed multiple urethral strictures, which were dilated with LaForte sounds on several occasions. The penis was amputated 10 days following admission.

For several weeks following the operation he experienced some frequency and dysuria. The urine remained infected, and the urethral strictures were dilated at intervals.

On Aug. 2, 1937, there was no evidence of local recurrence. Meatal stenosis was present. The urine was grossly infected. There were a few very small inguinal glands on the right side.

He was not seen again until May 2, 1941, approximately 4½ years after the amputation of the penis. He was admitted to the hospital because of fever, pain, and a tender mass in the right upper quadrant and loin. He had experienced several chills and had been ill for about 3 weeks. A roentgenogram of the kidney, ureter, and bladder area revealed the large staghorn calculus in the right side. There was a large kidney outline and obliteration of the psoas muscle margin. A diagnosis was made of (1) calculus pyohydronephrosis and (2) paranephric abscess.

On May 5, 1941, through a lumbar incision a large paranephric abscess was evacuated, and 3 cortical abscesses opened. Several stone fragments were evacuated. From one area in the cortex profuse bleeding occurred and was not entirely controlled by packing. He was given 2 transfusions of 500 c.c. of citrated, unmatched blood from a universal donor. The postoperative recovery was satisfactory, but wound healing was slow. Several calculi were recovered from the wound and on the dressings after removal of the packs. Purulent drainage from the wound persisted. Several urine specimens were reported negative for tubercle bacilli. Since there was no evidence of local recurrence of the penile lesion and no change in the inguinal glands, nephrectomy was advised. The old scar was excised. The kidney capsule was an inch or more

in thickness, so that an intracapsular nephrectomy was done. The cortex was accidentally separated from the pedicle, and bleeding of course was profuse but was controlled by packing and a running suture within the capsule.

On Aug. 18, 1942, an examination revealed that a sinus persisted. The wound was reopened, and a portion of thickened capsule was removed.

Examination on Feb. 9, 1945, showed that several small sinuses with pockets remained. In January, 1947, the wound was healed. There was no evidence of recurrence of the penile cancer approximately 10 years after the amputation. The inguinal glands were the same.

Clinically there are 2 types of epithelioma of the penis, the papillary type and the flat type. Histologically, they are all of the squamous cell type. Generally speaking, the majority are of a low grade malignancy, group 1 or 2 (Broder's classification). The flat tumors usually appear as rather superficial, small pimples or ulcers which may or may not be elevated. As the lesion grows, it becomes more infiltrating in nature, and the margins may have a rolled appearance. This lesion is definitely indurated from its beginning.

The papillary type of tumor usually begins as a single, wart-like growth either on the glans or the mucosa of the prepuce. These tumors may be multiple or may coalesce to form a single tumor. As the tumor increases in size, healthy tissue is gradually transformed into epithelioma. Induration usually occurs late. Ulceration in this type of lesion is common and practically always associated with infection, thereby producing marked irritation with subsequent necrosis. Bleeding sometimes occurs as in the case just described.

The rate of growth in both types of lesion is extremely variable. In some instances, a slow rate of growth combined with a low grade of malignancy affords the patient a good chance of cure, even though he may delay considerably in seeking medical relief.

It is to be remembered and emphasized that in spite of the generally low grade of malignancy of these lesions, unless they are adequately treated early, they are invariably fatal. The 2 following cases well illustrate this point:

G. H., aged 52, entered the Clinic on Dec. 7, 1934, complaining of a sore on the penis which had been present about 10 years. The lesion was extremely painful, and he had burned it at least 6 times with phenol. There was no difficulty in urinating. There had been loss of strength and weight. His past history disclosed that he had always had a long, tight and, for the most part, irreducible prepuce. In 1925 he had first noted an irregular mass growing from beneath the prepuce, which gradually increased in size and caused increasing discomfort, so that in 1930, 5 years following his first notice of the growth, he was circumcised, and the mass was removed.

Approximately 2 years later the growth recurred at the site of the former

one, and this was the lesion for which he sought relief at the Clinic. Examination disclosed a firm, cauliflower-like mass ulcerating in some areas and involving the entire glans, except the frenal aspect. On the dorsal side it extended beyond the sulcus. The meatus was sclerotic, and there were hard, moderate-sized glands in both inguinal regions. There was a moderate degree of anemia. The general examination was otherwise negative. Amputation of the penis was advised.

He did not accept operation, and, as an alternative, destruction of the growth by electrocoagulation was proposed. Since the clinical history suggested a low grade malignancy, a fair result was anticipated from this form of treatment. Under spinal anesthesia the lesion was thoroughly treated by electro-excision and coagulation.

Postoperative recovery was uneventful. A month later the areas were entirely healed. The patient was urged to have a biopsy of the inguinal glands. He declined since his general health was so much improved. The pathologic report was extremely interesting and read as follows:

"The sections reveal a papillary epithelioid neoplasm. The squamous cells are large and well differentiated. However, the basal layers show marked activity which is evidenced by large hyperchromatic nuclei and a few mitotic figures. Nevertheless, the basic membranes appear everywhere intact, and the invasion is mainly by extension of papillary structures without migration of cells from the limiting membrane. Diagnosis: squamous cell papilloma, malignancy, grade 1."

In March, 1936, about 14 months following electro-excision and coagulation, the patient wrote that the growth had returned, had grown to about the size of a pea, and then had dropped off.

In April, 1936, examination showed no evidence of recurrence. The inguinal glands were swollen but were possibly somewhat smaller in size. His general health was good.

On Jan. 6, 1937, in answer to a questionnaire the patient stated that the growth had recurred and was about the size of a hazelnut. He did not state when the recurrence was first noted. He was advised to return for observation. However, he did not, and in May, 1937, he wrote that the growth had increased in size but that he would not have any "knife" operations.

At this time my note on the record was as follows: "This patient has been extremely fortunate and while the lesion will, I am sure, eventually take his life, I think that, even after this long period of time and after recurrent growth, either a 'knife' operation or electrocoagulation may control the lesion."

In 1938, in reply to a follow-up letter, I received a letter from his local physician stating that death had occurred in September, 1938, from generalized carcinomatosis. The physician stated he had never observed such extensive lesions. There were several in the scalp and several ulcerated ones in the skin of the abdomen.

A. W. (29-556), aged 42, came to the Clinic in January, 1922, complaining of a sore on the penis, which had appeared approximately one year previously. It had gradually increased in size, was nonpainful, although there was some discomfort. Examination disclosed a redundant phimotic prepuce. There was an indurated ulcer on the ventral surface involving the frenulum of the penis just behind the coronal sulcus approximately 1½ cm. in diameter.

There were a few small shot-like glands in both groins. A biopsy of the lesion revealed prickle cell epithelioma with active invasive growth. At the time the section was taken for biopsy 4 radium needles of 50 mg. each were inserted into the lesion and left in place for 4 hours. Six weeks following the radium treatment the ulcerated area was healed, and the patient was circumcised and a small mass of glands removed from both groins. Unfortunately, they were not examined pathologically.

When examined on Aug. 27, 1923, the area was entirely healed, and there was no evidence of local recurrence. Examination in June, 1924, or approximately 2½ years following the radium treatment, revealed no evidence of local recurrence. He was not seen again until Feb. 14, 1939, about 17 years after his first visit, when he returned because of a recurrence of the lesion. He stated that some time in the summer of 1924, following his visit to the Clinic in June of that year, the ulcer had again opened up and had remained ulcerated and gradually increased in size. At times it would crust over and become sore and painful.

Examination at this time revealed an ulcerating lesion in the frenulum surrounded by a large infiltrated area. The mucosa of the glans was edematous and swollen. There were no palpable glands in the groins. Rectal examination revealed a prostate of normal size and consistency. The diagnosis was epithelioma of the penis. This is unusual in view of the long duration of the lesion. There was no evidence of metastases in the groins. Since the lesion had been present so long without more involvement and evidence of metastasis, I was of the opinion that control of the lesion might still be expected following amputation, which was advised and done by the Nesbit technic on Mar. 9, 1939.

When seen on July 13, 1939, there was no evidence of local recurrence nor masses in the groin. There was a meatal stenosis which admitted a size 20 F. sound.

He returned to the Clinic on Mar. 20, 1941, because of some masses in the left inguinal region which had been present for approximately 2 months. These were small and painful, and there was no history of recent infection or injuries to the left leg or foot. Examination disclosed a mass about the size of a walnut below and beneath Poupart's ligament on the left side. It was irregular and partially fixed. There were no masses in the right groin. There was no evidence of local recurrence. The diagnosis was metastatic carcinoma. X-ray therapy was advised, which he received. Masses subsequently developed in the right groin with ulceration on both sides, and death occurred in December, 1941, about 20 years following the first appearance of the lesion.

It is not unreasonable to suppose that if amputation of the penis had been performed in 1924 at the time of the recurrence, a permanent cure could have been obtained.

I do not wish to leave the impression that all these lesions grow slowly even in the aged patient and that metastases occur late. We have no way of knowing how well the following patient would have responded to simple amputation done early in the course of the disease:

T. D. (136-391), aged 75, came to the Clinic on Apr. 1, 1946, because of a large cauliflower mass on the penis. He had never been circumcised. Approximately 2 years previously he had noted a sore on the glans penis and foreskin which had gradually increased in size and become warty in nature. He had been treated by a cancer quack and had been confined to his hospital for 15 weeks at the last admission and treated by salves and lights.

Examination disclosed a large fungating mass with a foul, odorous discharge. There was induration and thickening of two thirds of the entire shaft of the penis. There were a few small glands in the right groin; none were palpable on the left.

The patient was promptly informed of the nature of the lesion; he was reluctant to accept the fact. He was advised that metastasis would undoubtedly occur after operation, although I did not anticipate them as soon as they did occur. In order to rid him of the malodorous mass, amputation was advised.

On April 16, 1946, amputation of the penis was done by the Graves method with transplantation of the urethra into the perineum. Healing was satisfactory except for some drainage from both groins.

The pathologic report showed a squamous cell carcinoma, grade 2.

In July, 1946, the inguinal glands were removed bilaterally along with the surrounding fat. Sections showed metastatic carcinoma.

In October, 1946, there was recurrence in the entire wound with some urinary difficulty. In November, 1946, it was necessary to do a suprapubic cystotomy.

The patient died believing in the quack's advice that healing would occur but would be slow and that operation would be of no benefit. It may be that operation in such cases, even to rid a patient of a malodorous sore, is ill advised.

A study of most series of cases reveals that epithelioma of the penis begins as a small but definite lesion, the symptoms varying with the degree of phimosis present; that patients wait on the average of about one year before consulting a physician; and that in at least two thirds of the cases the lesion is definite enough to enable the physician to make a diagnosis of cancer. In many instances valuable time is lost by the physician trying local application and various types of medical treatment and not resorting to a biopsy. A biopsy provides the only sure method of establishing a diagnosis in these cases. Dean and his associates state that they have never seen any harm done to the patient when the biopsy is properly performed. Epithelioma must be differentiated from condylomata lata, tuberculous ulceration, chancre, and lymphopathia venerea.

The following cases illustrate the mode of onset of these lesions and illustrate clearly that a sore on the penis of a man over 50 that persists for a few weeks must always be suspected of being malignant. In both of these cases the attending physician made a clinical diagnosis of malignancy:

A. W. (95-864), aged 51, came to the Clinic on Mar. 10, 1939, because of a sore on the penis which had been present for 2 years. It had begun as a small red pimple on the glans and gradually increased in size. For 2 months prior to his admission its growth had been rapid. He had never been able fully to retract the foreskin. On admission the lesion was painful.

Examination disclosed a phimotic, irreducible prepuce. The left dorsal area of the glans was thickened and indurated. There was a cauliflower type of growth elevated about ⅛ inch. It extended across the midline. The entire area was 1½ by 1½ cm. There were a few small glands in the right groin. Several hard, shot-like glands, enlarged, grade 1, were present in the left groin. Biopsy was advised.

I did not see the patient again until Oct. 5, 1939. The lesion was much larger and had extended beyond the sulcus. The glands in the groins were as before. Amputation was performed by the Nesbit technic.

The pathologic report was squamous cell carcinoma, malignancy, grade 1.

The patient moved to a western state, and I have not had an opportunity to examine him. His referring physician and a relative reported that he was alive and that there was no evidence of local recurrence in January, 1947.

G. E. U. (131-990), aged 64, was referred by his physician on Sept. 10, 1945, because of a sore on the penis of 4 or 5 weeks' duration. It began as a small pimple, opened spontaneously, and bled profusely. After this episode of bleeding it began to increase in size. The lesion was not painful, but there had been a little more than the usual amount of irritation which he had always had from a phimotic prepuce.

Examination disclosed that the margins of the prepuce were pearl-gray, with fissures. On the right side of the glans was a cauliflower-type of lesion, which involved about two thirds of the glans. The lesion was firm, and the glans was indurated.

There were small discrete inguinal nodes on both sides.

A biopsy was done Sept. 12, 1945, and the pathologic report showed a prickle cell epithelioma. Amputation was performed by the Nesbit technic 5 days later.

On Sept. 12, 1946, examination disclosed no evidence of local recurrence, and the inguinal glands were the same as at the time of admission.

May 1, 1948, examination revealed no evidence of local recurrence, and the inguinal glands were as before.

J. W. M. (102-662), aged 56, was referred to the Clinic on Feb. 1, 1941, because of a sore on the penis of 4 months' duration. The lesion had undoubtedly been present for some time. A purulent discharge, which had become irritating, was the immediate cause of his seeking relief.

Examination disclosed a phimotic prepuce which had been that way for years and could not be reduced. There was a cauliflower-type of lesion on the ventral aspect of the glans and prepuce. There was a moderate degree of induration along the free margin of the prepuce. The growth extended in masses of implants that coalesced. There were a few small inguinal glands on both sides, no more than commonly seen in most men.

On Feb. 4, 1941, a biopsy was done, and the pathologic report showed squa-

mous cell carcinoma, malignancy, grade 1. Amputation was performed February 6, by the Nesbit technic.

On Aug. 19, 1944, the patient had dilatation of the meatus for a stenosis which developed. There were no urinary symptoms and no evidence of local recurrence. The glands were as before.

On Jan. 16, 1946, he came to the Clinic because of weakness, generalized aching, polydypsia and frequency of urination every hour during the day and every 2 hours at night. These symptoms had been present since the fall of 1945. For about a year he had noted hesitancy and difficulty with some decrease in the size and force of the stream. There had been some weight loss.

Examination disclosed no evidence of local recurrence, and the inguinal glands were as before. The meatus was stenotic but of ample size. There was 50 c.c. of residual urine. The prostate was enlarged, grade 3 (basis 1 to 4), hard, nodular, and irregular. The hemoglobin was 84 per cent; the red blood cell count, 4,910,000; and the white blood cell count, 11,650. The urine was acid, negative for albumin and sugar, and negative microscopically. The diagnosis was carcinoma of the prostate.

At the time of the first admission on Feb. 1, 1941, the prostate was described as normal in size and of a fibro-adenomatous type. It is possible that what I assumed as a fibrous prostate could have been an early carcinoma. If so, it would seem that symptoms of obstruction should have manifested themselves before the end of nearly 4 years.

On Jan. 23, 1946, 20 Gm. of tissue was resected. The pathologic examination of the tissue removed showed adenocarcinoma, malignancy, grade 2. He was put on 3 Gm. of stilbesterol daily, which dose he has maintained.

On Feb. 15, 1947, one year post-resection and 6 years postamputation, vesical function was good; he had frequency of urination, twice every night. The urine was clear. The prostatic mass was enlarged, grade 2, and was hard and nodular. His general health was good. There was no evidence of local recurrence of the penile lesion. The glands in the groins were the same.

On Jan. 15, 1948, 2 years post-resection and 7 years following amputation, there was no evidence of local recurrence or glandular metastases. The prostate showed a marked effect from the stilbestrol therapy, and his general health was good.

Multiple primary malignancies occurring in any system of the body are not common, and such multiple lesions in the genito-urinary tract are also uncommon. In reviewing the literature on epithelioma of the penis, I have not found a similar case reported. Cases of carcinoma of the prostate with metastases to the penis have been reported. The co-existence of penile cancer and a primary malignancy elsewhere has been noted. Melicow and Ganem observed 3 cases in their series. The esophagus, tongue, and stomach were the sites. Bowing, Fricke, and Counseller in their series of 195 cases noted 7 patients with an associated primary malignancy: 3 cases of cancer of the lip, 2 of the face, one of the bladder, and one of the rectosigmoid. Metastatic malignancy of the penis is rare. A variety of metastatic lesions have been reported.

In all probability death eventually will result in this case from the carcinoma of the prostate.

Metastases occur from epithelioma of the penis as in epitheliomas elsewhere in the body, the most common site for metastases in cancer of the penis being the lymph nodes of the groin. At the time of first examination, in approximately three fourths of the patients with this disease, enlarged inguinal glands will be found. However, in approximately 50 per cent the enlarged glands will not show evidence of metastases on microscopic examination, the adenopathy being due to chronic infection associated with the lesion. Batson has shown from his anatomic studies that metastases may occur by way of the venous system. Entrance of the cancer cells into the dorsal vein of the penis could account for the widespread metastases seen in some cases.

The treatment of epithelioma of the penis has been modified materially during the past few years. The performance at one "sitting" of the so-called radical operation, with extirpation of the glands of the groin, with or without emasculation, was the method in vogue until several years ago when several investigators called attention to the protective nature of the lymph nodes. The mortality from such an operation was approximately 20 per cent. Death in most cases resulted from sepsis, due to infection of the wound arising from the chronic infection commonly present in the lymph nodes. As previously stated, since only about 50 per cent of the glands show metastasis even though palpable glands are present, this form of radical treatment is unwarranted.

The following practice then developed: amputation of the penis followed by deep x-ray therapy to the gland-bearing areas and dissection of the glands before the skin changes resulting from deep x-ray therapy become pronounced.

The treatment where groin metastasis has already occurred leaves much to be desired, and I will not enter into a discussion of the various methods of treatment and their results.

For the treatment of small, superficial lesions that are not larger than 2 cm. in diameter Dean and his associates recommended the use of a radium plaque.

In the treatment of larger lesions, simple amputation of the penis, 1.5 to 2 cm. proximal to any visible or palpable evidence of the growth, is advised; after amputation some time should be allowed for observation of any palpable glands which may be present. The swelling in the glands usually subsides, but if it does not, a biopsy should be performed, after which one of the various suggested methods of treatment should be employed. Dean and his associates

state that they have never had a local recurrence following an operation thus done and that approximately 65 per cent of their cases have been controlled.

The absence of palpable glands does not rule out the possibility of metastatic involvement of the inguinal lymph nodes. Colby and Smith found microscopic evidence of metastatic carcinoma in the glands of 4 of 11 such cases. Melicow and Ganem advocate the routine inguinal lymph node dissection in all cases of penile cancer unless contraindicated because of metastases elsewhere than to the glands or if the patient's general condition does not warrant. Modern chemotherapy and the antibiotics should materially reduce the sepsis which follows inguinal node dissection and promote more rapid healing.

SUMMARY

From the knowledge accumulated concerning epithelioma of the penis, we may conclude that it is caused by irritation from retained secretions beneath a phimotic prepuce. Circumcision in early infancy will prevent the later development of epithelioma of the penis. As evidence of this fact, no case has ever been reported in a Jew who has had a ritualistic circumcision. Circumcision in childhood affords some protection, and in infancy almost absolute protection.

The majority of cases, when first seen, present a definite type of lesion which should warrant suspicion of malignancy. In approximately two thirds of these patients, when first seen, the disease can be adequately controlled by radium and surgery. In the past, the treatment of groin metastases has been very unsatisfactory, but more recent work, with refinements in the technic of x-ray therapy, gives promise of better results.

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CARCINOMA OF THE UTERUS

That progress has been made and is being made in the early diagnosis and treatment of cancer is proved by statistical records now available from many sources. Even so too many people are losing their lives from this dread disease. New methods for early diagnosis must be found. Educational campaigns must be conducted for both lay and professional groups. New technicians and a greater number of technicians must be trained in the study of diagnostic methods now available if medical science hopes to make progress comparable with the other branches of science. Medical colleges should arrange their curricula to train more technical experts and fewer specialists. Hospital laboratories should be equipped with better facilities in both personnel and material for making diagnosis, and a trained pathologist should be available in every operating room.

Papanicolaou calls attention to the birth of a new "branch of the morphological sciences; that of the comparative cytology of exfoliated cells found in body cavities." Whether this discovery can be translated into practical significance and cancer cells found before tissue invasion is begun, will be determined by trained technical experts. The busy doctor will never have sufficient time to devote to the technical requirements for the recognition and differentiation of the structural variations in the normal and abnormal cell forms of cancer. Shields Warren says that "histologic diagnosis and clas-

sification of tumors is the sheet anchor of the treatment of cancer." This statement is true in the management of the tumor growth, but what about a scientific approach before the tumor is formed? We are interested today in prevention as well as in treatment. The American Society for the Control of Cancer is emphasizing "Control." It will be difficult to control cancer unless we are able to find it early enough to prevent its invasion of tissue.

According to Papanicolaou, Traut and Meigs the vaginal smear method for the detection of cancer cells, quoting Warren, "may give information not available by biopsy and curettage, and that it will demonstrate symptomless cancer." He states further, however, that "In spite of its apparent simplicity and accuracy, the method is not an easy, sure means of diagnosis.

The usual symptoms of cancer of the uterus, abnormal bleeding, foul discharge, etc., are late manifestations whether the lesion is in the cervix or in the fundus. By the time these symptoms appear the walls are already invaded by cancer cells. It is at this stage that the surgeon is called upon to make a diagnosis and to render treatment.

Cancer of the cervix occurs eight times more often than that of the fundus, and approximately ten years earlier in life. Approximately 80 per cent of cervical cancer belongs to the epidermoid or squamous cell variety. The number of 5 year cures in grade I and II operative cases is about the same whether surgery or radiation therapy is used, and varies according to different authors, from 15 to 65 per cent.

Harry H. Bowing and Robert E. Fricke of Rochester reported from the Mayo Clinic in a paper, "Late Results of Radium Therapy for Carcinoma of the Uterine Cervix," Journal of the American Medical Association, July 10, 1948, a 5 year survival of 58.8 per cent in stage I, 65.3 per cent in stage II, 33.7 per cent in stage III, and 16.5 per cent in stage IV. This report covered a period from 1915 to 1944 inclusive of 2,246 cases, 85 per cent of which had advanced carcinoma when treated.

Cancer of the fundus occurs later in life, usually after the menopause, and the cells belong to the glandular or adenocarcinomatous variety. The number of 5 year survivals appears to be greater after radium or roentgen ray therapy than after surgery.

Is cancer on the increase? According to Ochsner, DeBakey and Richman, "The incidence of bronchiogenic carcinoma has increased more than cancer anywhere else in the body. In Georgia the mortality rate from primary malignancy of the respiratory tract has increased progressively from 23 per 100,000 population in 1934 to 200 deaths in 1943." This disease ranks second among all diseases

causing death. If it is increasing, why is it? I quote from a paper, "Preventable Human Deterioration," by Edward L. Bortz, President, American Medical Association, published in the Mississippi Medical Journal of July, 1948. "Is society deteriorating? Are we as human beings deteriorating? As we stand at the dawn of a new era —the atomic age—with all of its promise of longer life and the control of those destructive forces which annihilate our loved ones, will medicine furnish the leadership and take its place in directing researches for the further limitation of human afflictions, and for the control of those forces which will bring a more stable social order?"

Could it be that the discovery made by Papanicolaou is the beginning in the control of cancer? It is claimed that the percentage of malignant cases recognized by the smear method has ranged between 94 per cent and 80 per cent in different hands and that malignant cells were found in symptomless cases in .4 and 1.6 per cent in the examination of two groups of apparently healthy women.

Maurice Fremont-Smith and Ruth M. Graham of Boston reported in the Journal of the American Medical Association, July 10, 1948, in a paper entitled "The Vaginal Smear Method," 2 per cent positive findings in 200 patients of unsuspected cancer.

In our group of cases during 1947 we found cancer cells in .5 per cent of the symptomless cases examined at the Cancer Detection Center of the Sheffield Cancer Clinic in Atlanta.

Ochsner et al in discussing bronchiogenic carcinoma state that "An extremely valuable diagnostic method is the demonstration of tumor cells in the sputum or in the aspirated bronchial secretion. This procedure although tedious and time consuming when performed by a competently trained individual gives a correct diagnosis in 90 per cent of the cases."

A great deal of investigation and study is now in progress. If the smear method proves to be an effective means of detecting cancer cells before symptoms are present and before tissue invasion has begun, no physical examination will be complete until a study of the secretions from all body cavities has been made.

What is cancer? Is it a manifestation of body deterioration due to perverted physiologic processes—to environmental changes—to nutritional disorders—to endocrine imbalance? Is it an allergic manifestation? Just why do normal cells take on abnormal and belligerent growth? How early does this wild orgy begin in the body? We see it in infancy as well as in mid-life and old age.

Some of these questions are discussed in a paper entitled "The

Meaning of Cancer Research" by R. R. Spencer, M.D., of Washington, D. C., which appeared in American Medical Association Journal, Aug. 14, 1948. The author refers to what the late Dr. James Ewing called "the casual genesis" of cancer, i.e., the multiple external and internal environmental agents and conditions that start the carcinogenic process but are not essential thereafter to its continuation.

Prior to the early part of the 20th century diabetes was a scourge as great and difficult to manage as cancer is today. In 1922 Banting and Best gave to the world the answer to this mysterious disease. Cancer research will some day give the answer to the mysteries of cancer. What it is and how to prevent and cure it.

During the past year forty-six cancer control projects have been approved by the Federal Security Administration and $766,748 has been granted to finance these projects. In addition to these, three new grants totaling $1,134,368, have been made for cancer research.

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